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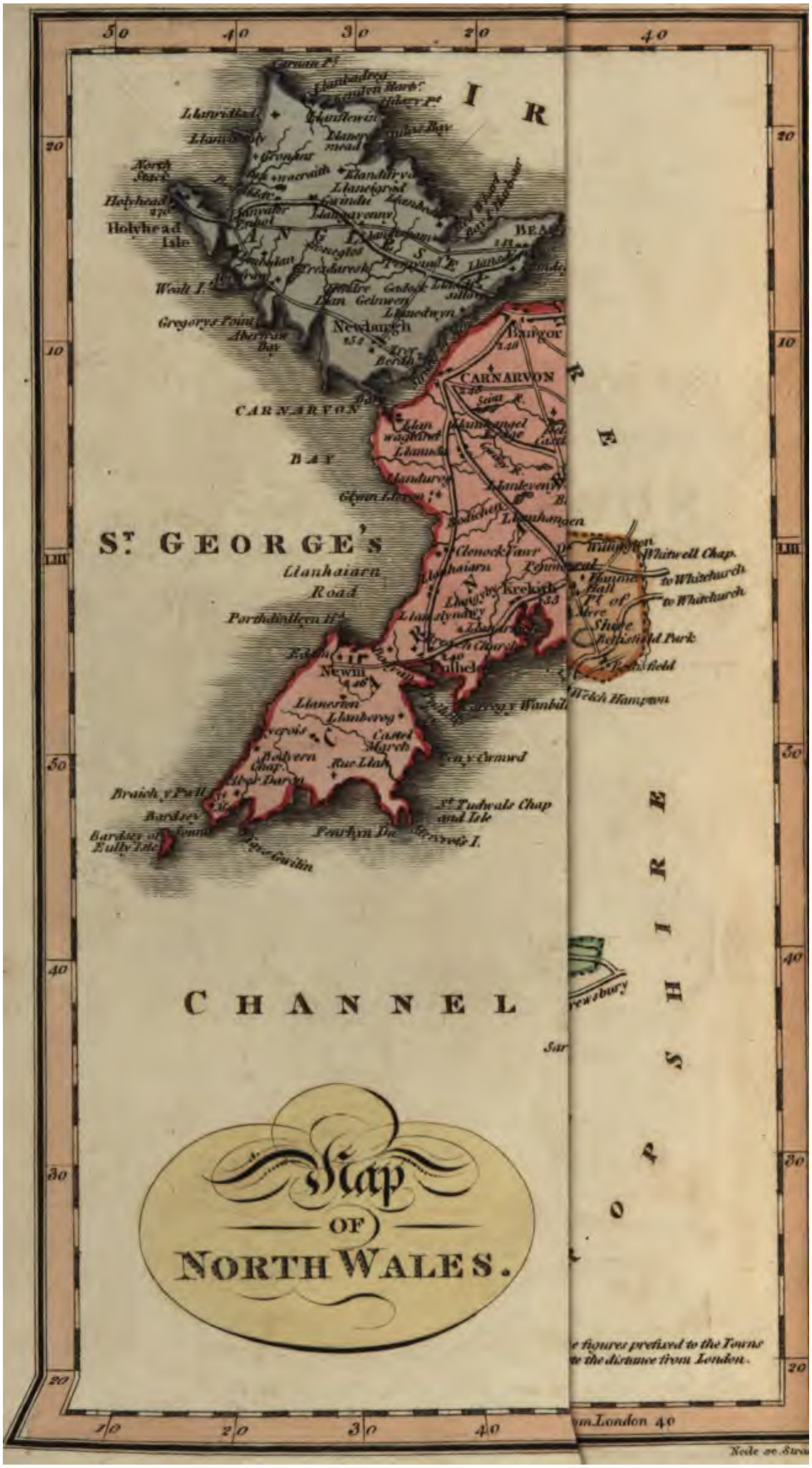
Map of North Wales.
St. George's
Channel
Ireland
Carnarvon Bay
Llanhaiarn Road
Anglesey
Holyhead Isle
Holyhead
North Stack
Beaumaris
Newburgh
Bangor
Carnarvon
Clenock Vawr
Llanhaiarn
Krekieth
Pwllheli
Newin
Porthdinlleyn Hd.
Llanengan
Aber Daron
Braich y Pull
Bardsey Island
St. Tudwals Chap and Isle
Penrhyn Du
Whitwell Chap.
to Whitchurch
Pt. of Shire
Bettisfield Park
Welch Hampton
Shrewsbury
Shropshire
The figures prefixed to the Towns are the distance from London.
London 40
Neele sc. Stra

GENERAL VIEW

OF THE

AGRICULTURE

AND

DOMESTIC ECONOMY

OF

NORTH WALES;

CONTAINING THE COUNTIES OF

ANGLESEY,	FLINT,
CAERNARVON,	MEIRIONYDD,
DENBIGH,	MONTGOMERY.

DRAWN UP AND PUBLISHED BY ORDER OF

THE BOARD OF AGRICULTURE
AND INTERNAL IMPROVEMENT.

BY WALTER DAVIES, A.M.

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THE desire that has been generally expressed, to have the AGRICULTURAL SURVEYS of the KINGDOM reprinted, with the additional Communications which have been received since the ORIGINAL REPORTS were circulated, has induced the BOARD OF AGRICULTURE to come to a resolution to reprint such as appear on the whole fit for publication.

It is proper at the same time to add, that the Board does not consider itself responsible for every statement contained in the Reports thus reprinted, and that it will thankfully acknowledge any additional information which may still be communicated.

N. B. *Letters to the Board, may be addressed to Sir* JOHN SINCLAIR, *Bart. M.P. the President, No.* 32, *Sackville-Street, Piccadilly, London.*

INTRODUCTION.

A SKETCH OF THE STATE OF AGRICULTURE, AMONG THE ANCIENT BRITONS.

AGRICULTURE, like all other primitive arts, originating in the plains of Asia, gradually extended itself towards the several extremities of the globe. In the progress of migration, a colony at Marseilles is recorded to have brought some knowledge of Grecian Agriculture into Gaul, long before its conquest by Cæsar; and it is mentioned in History*, that the inhabitants of Britain, as well as their neighbours, on the continent, had attained some knowledge in the art of tilling and manuring land. They restored the vegetative power to decayed soil, by the fertilizing aid of *marl;* an article of manure, till then, totally unknown to the Romans. In return, it may be presumed, both the use of calcined limestone as a manure, and its name, *calch,* our islanders borrowed of their conquerors. Of all the wars that have scourged the world from its creation to the present day, that of the Romans against more barbarous nations is the most defensible. However cursed with avaricious ambition in its design, and with the most cruel bloodshed in its execution; yet it was attended with consequences ultimately beneficial to the subjugated survivors. The Roman Eagle transported with it civilization and the Arts wherever it flew. The Agriculture of Britain derived valuable acquisitions from the victories of Ostorius and Agricola.

---

* Plin. xvii. 6, 7, 8, 15; xviii. 30.—Pallad. xvii. 2.

Corn, in general, was by our ancestors called *ith*, and in some provincial dialects *yd*; wheat, from its being sown in the spring, had the appellation of *gwanwyn-ith*, now by an easy contraction *gwenith*; and barley, from its being sown in May, was termed *ha-ith*, now softened into *haidd.*

A Gaulish name of wheat was *brac*[*], a term still denoting some species of grain among the inhabitants of Brittany; and in Ireland it signifies *wheat*, in particular. Contrary to the present practice, it seems that at times, they converted their barley[†] into bread, and their wheat into malt. Malt is, to this day, called *braich* in Erse, and *brac* in Welsh, from the species of Gaulish wheat out of which it may have been originally made. The liquid brewed from their *brac* was called *cwrw*, a term perhaps previously given to a beverage which they extracted from the ripe berries of the mountain-ash[*], the *sorbus aucuparius* of Linnæus. This tree is still called in some parts of France, *courme*[†]; in Wales, *ceri*[‡]; and in the Highlands of Scotland, *caoran*[§].

---

[*] ——"suum genus *farris*, quod illic *brac* vocant."—Plin. xvii. 7. Commentators on Pliny distinguish *far* from *triticum*, by saying that the latter was *smooth-eared*, and the former *bearded* wheat. The ancient Welsh wheat, called *gwenith bychany wlad*, now nearly, if not altogether lost, agreeably to the description of the commentators, was *bearded.*

[†] Winter barley is still called in South Wales, *barlys*, q. d. *bara-lys*, the *bread-grain*; or, more literally, the *bread-herb.* The English name, *barley*, must be derived from *bara-lys*, until a better etymon be found.

The continued series of calamities that followed the departure of the Romans, proved fatal to British Agriculture. Harassed with the perpetual incursions of their invaders, the Britons sunk into despondence, and for ages became retrograde towards that state of barbarism, from which they had lately emerged. Aversion from rural industry became epidemic, and extended its baneful influence through every rank, from the throne of the monarch to the cottage of the meanest vassal. To enhance the sterility of the island, its new lords, the Saxons, inherited from their warlike ancestors an habitual dislike to agriculture. The armorial bearings of our nobility and gentry, prove from what sources their progenitors derived their fame and their fortunes.

---

[*] Mountain-ash berries, and burnt sugar, have been added, in brewing ale, to imitate porter. *Diod-griawol*, is still used by the country people, as a medicinal beverage.

[†] Gerard's Herbal, voc. *Sorbus*.

[‡] There are places that have, apparently, taken their names from having had plantations of the mountain-ash, such as Kerry, a parish in Montgomeryshire, &c. Dioscorides says, (de var. gener. herbar. lib. 2), that the *courmi*, (cwrw) of the Britons, was an extract from barley, and also from *wheat*. The *cerevisia* of Diodorus, (p. 4, 41, 242, 248, 250) is literally *ceri-uisg*, i. e. the juice of the mountain-ash berries. Of barley, (says Pliny, lib. xiv. c. 22.—xxii. c. 25), *ceria* is made in Spain, and *cerevisia* in Gaul; the term being at length transferred from one kind of beverage to another.

[§] *Caoran*, signifies, by way of eminence, *the tree*.

Necessity, however, will compel men to break laws, customs, and habits; it will subdue their passions and prejudices; and we find that want and famine actually converted into ploughshares the swords of the furious warriors. About the middle of the tenth century, a faint glimmering of the revival of agriculture appeared. Then, England had *Edgar* the *peaceable*, and Wales had *Howel* the *good*. Some of the laws of the latter would not discredit a more enlightened age. Statutes relative to agriculture are found in the Welsh Justinian's pandect. The remuneration for bringing woodlands under tillage, and the utility of fallowing and manuring, are respectively defined. Although the wealth of the nation, at that time, may be supposed to have consisted chiefly of cattle; yet we find those, apparently, so few, that the legislature saw the necessity of regulating, if not establishing, *ploughing societies**. To compose a team, one member furnished a plough, a second, irons; the third and fourth, men; the fifth, sixth, &c. oxen. The best acre† in quality, so ploughed, was the portion, or *merces arationis* of the *maker* and *conductor* of the plough, who was appointed by law to be the one and same person: the second acre was given to the owner of the plough irons; the third, to the owner of the right-hand ox, in the rear; the fourth, to the owner of its yoke-mate; the fifth, to the driver; and then an acre to the owner of each of the remaining oxen: and the last acre of all to the furnisher of the plough timber‡. Oxen only were permitted to draw the plough§.

---

* Wotton's Leg. Wal. p. 280. The term in the original is *cyfar*; from cyf, *con*, and âr, *aratio*. At present the term *cyfar* is only used to express a certain quantity of land, whether arable, meadow, or pasture: in the counties of Anglesey, Caernarvon, and Meirionydd, it is only half a statute acre; probably from its being the usual quantity ploughed in a day by a society-team. In the eastern part of Montgomeryshire, a full acre is now called *cyfar*.

† For the dimensions of this acre, or *erw*, see Section on Weights and Measures, Ch. XVII.

‡ These ploughing societies seem to have formerly existed in Scotland; for in the Erse language, a plough is called *beart threalhaida*, i. e. an implement for the common use of a township, or clan; and the ploughman is termed *fear-crann*, which implies the furnisher of the plough-timber.

§ "Nec equi, nec equæ, nec vaccæ, aratro jungentur."—*Wotton*, p. 283.

After the death of Arthur, and the Saxon power prevailing, the dispersed Britons were forced to quit England, and seek refuge among their brethren in Wales. All the vallies at that time being pre-occupied, the great and sudden influx of the refugees made it necessary, for a season, to cultivate the slopes, and even the summits of the hills, wherever there was found a sufficient depth of soil. And, for a reason rather obscure to us, the ridges were generally ploughed straight upwards; and their forms are still visible in several parts of the country*. This method of ploughing required great strength of oxen; and accordingly we find, that when Giraldus wrote his Itinerary, in the twelfth century, the Welsh yoked their oxen four a-breast†. In the laws of Howel, yokes of four different lengths are mentioned: the *ber-iau*, or short yoke of three feet, for two oxen; the *mei-iau*, or field-yoke of six feet, for four oxen; the *ceseil-iau*, or axillary yoke of nine feet, for six oxen; and the *hir-iau*, or long yoke of twelve feet, for eight oxen‡. This custom of yoking so many animals a-breast, has, for some centuries back*, been disused in Wales, though still existing in Scotland†.

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* These ridges are frequently so steep as to form an angle of between 30 and 40 degrees with the horizon.

† "Boves ad aratra vel plaustra, non binos jungunt, sed quaternos." This note was found in a manuscript copy of Giraldus, in the possession of Archbishop Usher, and copied by Mr. Robert Vaughan.

‡ Wotton, in his translation of the Welsh Laws, renders the lengths of the yokes *literally*, namely, 4, 8, 12, and 16 feet. Here

The redundancy of population in Wales, occasioned by the retreat of the *Lloegrian* Britons, being in time reduced nearly to its original standard, by foreign irruptions, domestic feuds, and scarcity of provisions; the cultivation of the bleakest and steepest hills was in a great degree relinquished. The exertions of agriculturists continued languid, from that remote period to the middle of the eighteenth century. Then, from the same quarter as that bright vehicle of heat ariseth to enliven our soils with genial warmth, light shone upon our husbandry also: the genius of improvement came forth from the east; gradually explored the desert waste, left some traces of his influence, even in the most inaccessible solitudes, and included the extremities of our west-

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Here it was thought preferable to reduce them to the English standard; as the Welsh foot measure, of three barley-corns to the inch, three inches to the hand, and three hands to the foot, is no more than 9 inches of the present scale.

* Mr. William Owen, in his Welsh Dictionary, says, "the Welsh used four sorts of yokes, until as late as about the year 1600.

† "In the parishes of Moulin and Logierait, in Perthshire, the ploughs are drawn by four horses yoked a-breast; and driven by a man who holds the horses by the halters, and walks backwards."—*Statistic Accounts of Scotland*, vol. v. p. 77.

ern shores within the circle of his British domain. Some particulars of these recent improvements, together with occasional hints towards progressive attainments, will be attempted in the several Sections of the following Report.

ERRATUM.

P. 278, second line from the bottom, after the word with, *read* gunpowder.

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AGRICULTURAL SURVEY OF NORTH WALES.

CHAP. I.

GEOGRAPHICAL STATE AND CIRCUMSTANCES.

SECT. I. AND II.—SITUATION, EXTENT, AND DIVISIONS.

THE district of North Wales, a territory ascribed, by Roman writers, to the warlike tribe of the Ordovices, comprehending, before its union with England, the kingdom of Gwynedd, latinized Venedotia, and the greater part of the principality of Powys;—is situate to the north-west of London; and jutting out into the Irish Sea, opposite Dublin, forms the most northern, although the least, of the three western promontories of South Britain. In shape it represents a human figure; of which, the Isle of Anglesey forms the head, and the promontory of Lleyn the arm, at full length, as it were extended to take hold of Bardsey Island. Its boundaries are, the Irish Sea to the north; Cheshire, and part of Shropshire, to the east; the other part of Shropshire, Radnorshire, and Cardiganshire.

ganshire, to the south; and St. George's Channel, to the west.

Its two greatest dimensions, crossing each other at right angles, are, from Carnel's Point in Anglesey, opposite Skerry Island, on the north-west, to Offa's Dyke, near Bishop's Castle in Shropshire, on the south-east, 87 miles; and from Aberdaron Point, near Bardsey Island, on the south-west, to the estuary of the Dee at Flint, 75 miles.

For the sake of uniformity in the division of the realm, it was shired* by Henry the Eighth into six counties.

1. *Tir-Môn*, the Mona of Tacitus, consisting of the three cantrevs, or hundreds, of Aberffraw, Cemaes, and Rhoshir; and insulated by the sea and the strait of Menai, its natural boundaries,—was called the county *Angles-ey*.

2. *Gwlâd Arvon*, or the land over against Mona, consisting of the four cantrevs of Aber, Arvon, Dunodic, and Lleyn, with the comot of Creuddyn; was, from its chief town, called *Caernarvonshire*.

3. *Y Berfeddwlad*, or the inland country, containing the four cantrevs of Rhyvonioe, Ystrad, Rhôs, and Dyffryn Clwyd; with the cantrevs of Rhaiadr and Trevred, and the comots of Dinmael and Maelor; had, from its chief town, the name of *Denbighshire*.

4. The comots of Rhuddlan, Prestatyn, and Cynsylet, in the cantrev of Tegengl; the comots of Ystrad Alyn, and Caer Gwrle, in the cantrev of Rhiw; and the comots of Merffordd, and Maelor, in the cantrev of Uwchnant; were incorporated into a county by the name of *Flintshire*†.

---

* From scẏꞃan, Sax. to divide.

† Flint, the county-town, was so called from the great abundance of semi-flint, or chert, found in the neighbourhood.

5. The district of *Meirionydd* had its name from its chief cantrev, Meirion; and that, from being the portion of Meirion, grandson to Cunedda, a prince of North Britain, who came into North Wales in the fifth century, to rescue it from some Irish invaders. Succeeding in the enterprise, he gavelled the region among his ten sons, and two grandsons, *Meirion* and Maelor. Meirionydd was called by Giraldus, *Terra filiorum Conani;* and anciently contained three cantrevs, Meirion, Penllyn, and Arwystli. The latter, lying to the south of the Dyfi, was, by Henry VIII., given to Montgomeryshire; and, in its stead, the comot of Ardudwy was taken from Arvon; and the comots of Mowddwy, Edeyrnion, and Glyndyfrdwy, were detached from Powys-land, and added to Meirionydd. This is the only county in North Wales which retains its ancient name, with the addition of *shire—Meirionyddshire.*

6. *Powys Wenwynwyn*, so called from a prince of that name, son of Owain Cyveiliog, containing the five cantrevs of Conan, Cedewain, Llyswynaf, Ystlyc, and Y Vyrnwy;—had the appellation of Montgomeryshire. By the Welsh it is called *Sir Drevaldwyn:* but they may as well call it Sîr Montgomery; for both Baldwyn and Montgomery were Normans.

The length of Anglesey, from Carnel's Point to Bangor Ferry, is 20 miles; and its greatest breadth, from Llanddwyn Abbey to Penmon Priory, 17 miles.

Caernarvonshire, from Aberdaron Point to Little Orme's Head, measures 54 miles; and at right angles, from Caernarvon town to Ysbytty Evan, 24 miles: across the promontory of Lleyn, from Nevin to Pwllheli, it measures only six miles.

Denbighshire, from Llanrwst on the the river Conwy to Holt, on the Dee, measures 36 miles; and across this line, from St. Asaph to Ysbytty Evan, 19 miles: its narrowest breadth over the Vale of Clwyd, from Llangynhaval to Derwen, is but nine miles.

Flintshire, from the mouth of the river Clwyd to Caer Gwrle Castle, measures 24 miles; and in breadth, from Flint to Nannerch, five miles. Maelor Saesnaeg, a detached part of the county, measures, from Bangor to Brick-hall, nine miles; and from Broughton to Penley, five miles.

Meirionyddshire, from Berthgelert near Snowdon to Bwlch y Vedwen, on the confine of Montgomeryshire, extends 43 miles; and from Harlech to the boundary of Llangollen parish, 38 miles.

Montgomeryshire, from the extremities of Llangurig on the borders of South Wales to Pistyll Rhaiadr, a noted cataract in the Berwyn Hills, measures 35 miles; and from Montgomery to Machynlleth, 30 miles.

Some other particulars of the six counties, are, for the sake of compactness, inserted in the following table.

Counties.	Number of Parishes by Report.	Market Towns.	Acres by Common Report.	Acres by Templeman's Survey.	Acres by a recent Survey.
Anglesey	74	5	200,000	158,720	173,000
Caernarvon	68	4	340,000	293,760	319,520
Denbigh	57	6	410,000	325,760	387,600
Flint	28	5	160,000	126,720	172,790
Meirionydd	37	6	500,000	396,800	430,000
Montgomery	47	7	560,000	444,800	491,600
Total	311	33	2,170,000	1,746,560	1,974,510

The acrage by recent survey is taken from Mr. Evans's map; being the only one, hitherto published, that has any claim to correctness. Most of the writers who have as yet given the acres of the sub-divisions of North Wales, are only the echoes of Camden and his editors, and have paid implicit credit to persons not much to be relied on.

SECT. III.—CLIMATE.

A COUNTRY whose surface exhibits many different degrees of altitude from the level of the sea, must necessarily have various temperatures; and those diversified by aspect, situation, and other circumstances. The climature of North Wales naturally divides itself into three kinds: that of the vales, the hills, and the mountains. The humidity of the atmosphere, on particular seasons, which, in the first climate, falls in rain; may be observed, in the second, to be sleet; and, in the third, perfect snow. In some years, snow remains on the higher hills until June: in the vicinity of the sea, and especially in the Isle of Anglesey, it seldom continues long, even in the depth of winter. The seasons of vegetation in spring, and ripening of grain in harvest, must, of course, be very various. Grain, on light soils, and in the lower vales, is ready for the scythe or sickle early in August; and in some forward years, the wheat has been all reaped before the beginning of September; when that month is said, by the peasants, to have lost its name, being of the same signification as the Messidor of the modern French; that is, *Mis Medi*, the reaping month.

Talar hir *, a piece of sandy soil, with some gravel, upon a substratum of sea-beach pebbles, under Penmaen Mawr in Caernarvonshire, is the earliest spot in North Wales. One year, in particular, its crop of barley was reaped, some of it thrashed, and ground, by the 10th of July. As a contrast to this, on some parts of the Hiraethog Hills in Denbighshire, no grain is sown but the hardy oat; of which, whole fields may be seen, on some years, as green as a leek in the month of October, and not likely to ripen at all. As genial climate vivifies the dormant powers of soil, and thereby promotes luxuriancy of vegetation; so in return, grounds judiciously laid out and planted, and soil well cultivated, have great influence in mollifying the rigour of climate: a kind of mutual reverberation of influence exists between earth and air. Of this, there is a clear instance in the vicinity of the bleak hills of Hiraethog, just now mentioned, on the rectorial glebe at Cerrig Druidion. The late Rector, from the year 1784 to 1799, by planting, draining, manuring, and good tillage in general, so counterbalanced the elevation and severity of climature, that it permitted him to raise abundant crops of corn, and to harvest them in season.

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* On this spot that loyal Cambrian, Sir John Owen of Clenennau, was taken prisoner, in the year 1648, in an engagement with Colonels Carter and Twisleton.

Some of the earlier farmers sow wheat in September; the generality, in October; and the slower sort in November, December, and January. However, experience demonstrates that in nine years out of ten, early sowing has the advantage. Pease are sown late in February, and beginning of March; oats early in March; and barley in April, and some in the beginning of May. Time of harvest is, sometimes in August, generally in September; and, in backward seasons, as late as October. Labourers, and even small farmers, from the uplands, were lately used to come down in numbers into the lowland harvest, for a fortnight or three weeks, and then return early enough to reap their own corn; but at present these migrating reapers are fewer in number, owing to superior tillage, and perhaps liming, which cause their own grain to ripen earlier.

The climature is, in general, unfavourable to the production of fruit. Although there be many profitable orchards, and gardens abounding with wall-fruit, in the vales; in the greater part of Meirionyddshire, and Caernarvonshire, all attempts to introduce them have hitherto proved abortive. There, the spring is seldom mild enough to preserve the blossoms from their adversary, frost; and the wetness, or coldness, of summer, soon vitiates the flavour of the most delicious fruit.

We have no such regular monsoons, or such systematic conflicts between eastern and western winds, in this district, as are described in the Report of the North Riding of Yorkshire, p. 5. The most constant winds here, are those from the eastern points of the compass, during long winter frosts, or backward cold springs. The western winds, however, have been observed to blow, one time with the other, about nine months in twelve, or three-fourths of the whole year *; but mostly prevail about the vernal and autumnal equinoxes: at those seasons, they are frequently exceedingly boisterous.

Characteristics of different Winds.

South Wind—Generally produces mild rain. It is considered as a surer prognostic of rain on dry weather, r of thaw on frosty weather, when the wind veers to his point from the east than from the west.

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* "The wind blowing for such a great part of the year from that quarter, makes Newfoundland so cold, and Britain, and its sister islands, so warm. Were the east wind to gain the ascendancy, the case would be reversed; Newfoundland would be the warmest of the two."

This observation was made by a settler in Newfoundland to Francis Lord Bacon.—*Bacon's Works*, vol. iii. p. 208.

South-West, *West*—Hard showers, storms, and sometimes constant rain, so as to produce high floods.

North-West—The stronger winds are from the south-west to this point. Trees are seldom unrooted, or buildings unroofed, save from this quarter. Farmers, in harvest time, &c. are not apprehensive of much rain when the wind is from the north-west. It may produce showers, but it soon dries again. Sleet and hail showers are more frequent from this point than any other. In Montgomeryshire it is called *gwynt y creigiau*, alluding to the Snowdonian rocks over which it blows.

North—Generally cold, dry; but frequently snow, sleet, and sometimes rain.

North-East to East by South—The heavier falls of snow are from these points; and rain the more constant of any, though not stormy. After long droughts, an old adage gives it the preference over the south wind in producing rain. "*Pan gollir y gwlaw—Or' dwyrain y daw*," *i. e.* Rain lost, to abound—From the east will be found. In parts of Montgomeryshire, west of Shrewsbury, the eastern wind is called, *gwynt coch y'Mwythig;* or the *red wind of Salop*, as it too effectually checks the verdure of spring.

April showers, or rain descending vertically when the air is in equilibrium, and interchanged with warm gleams of sunshine; are observed to be less frequent, for some years back, than formerly[*].

Although

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[*] The genial effect of these vernal showers on vegetation, caused a bard of a former age to exclaim with rapture—

"Dym

Although variableness of weather be the common characteristic of our climate, yet lamentable exceptions to the general rule sometimes occur. The following extracts from a diary kept in the eastern part of Montgomeryshire, and inserted in the phraseology of the writer, may be of service, when compared with diaries kept in distant parts, to judge how local, or how general, such states of the weather are.

1797.

June, July, August, and September, generally wet; the consequence was, that the ears of corn did not yield the usual quantity of grain; and that quantity was of very inferior quality.

1798.

Most of June and July very dry weather *; the hills with

"Dyma wlith y gwenith gwyn,
"Dyma'r bîr—Dyma'r bara a'r enllyn;
"Dyma'r mel a'r cwyr melyn,
"O byrth Duw, i borthi dyn!"

* The rustic observations on the choice of weather, for the several months of the year, are probably founded on experience.

1. *February*, the first month of spring, should be wet; not because it may be desirable in itself to be so; but because after a wet February, there is a greater probability for a dry March, one of the most valuable seasons: hence the adage,

"*February* full ditch,
2. "*March* full dust."
"A thimble-full of March dust is better for the land than a load of lime."
3. "*April* showers
"Make fat farmers."
4. "He who views his wheat on a weeping *May*,
"Will himself go weeping away;

5. "But

with a southern aspect, and grazed pastures became so scorched, as not likely to produce any grass for the remainder of the summer; but plenty of rain in the beginning of August, brought in a short time very luxuriant vegetation. The wheat of this year produced one-sixth more meal, or farina, than the wheat of 1797.

Nov. 18.—A heavy fall of snow, which continued for some days. It then set in for an early winter. Snow and frost, with few intermissions, until the middle of March.

1799.

Owing to the dryness of the summer months in 1798, checking the growth of hay and straw, and the snow and early winter in November damaging the aftermaths, &c. fodder became very scarce this spring; hay from 5*s*. to 12*s*. per cwt.; wheat-straw from 4*s*. to 7*s*. per thrave; mountain rushes carried to the towns for litter.

Spring altogether unseasonable: no rain, attended by warm weather, until the latter end of June. Crops of corn and hay very scanty. Rain, about the beginning of July, becoming prevalent, the crops improved in quantity at the expense of quality. Scarcely any summer weather. Not above *six* fair, sun-shining days

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5. "But he who views it in a weeping *June*,
"Will go away in another tune."

6. On the four following months adage is silent; the seasons of harvest, and wheat seedness, bespeak the farmer's choice. The following adage,

7. "*Gaua' glas—Mynwent vras*,"

i. e. "Open winter—frequent sepulture," does not seem to be founded on the basis of philosophy: it suits the fens of Lincolnshire better than the keen air of North Wales.

in the three summer months. Very wet, in general, the whole of July. Markets advancing—wheat, from 8*s*. 6*d*. to 12*s*. per bushel (Winchester); barley, from 5*s*. to 7*s*. &c.

August 1.—A solitary dry day; then rain daily. Wind wavering from south to west. On the 7th, having rained most of the preceding night, the sky appeared so threatening, as if it would have drowned the earth with a deluge. Wind shifted to W. by N. Fair about 10 A. M.: continued so all day. At twilight the vales were covered with fog.

8*th*.—Wind E. S. E. The sun rose of a bright reddish hue. At noon the sky lowred, the wind raised, and drove black flying clouds all the evening. About 8 P. M. it began to rain, and continued so, from the east, all night, and until ten o'clock next morning. All the corn fields flat.

Similar observations were registered every day, which for brevity sake must be here omitted. Rain daily to the

13*th*.—The second dry day this month. Wind S.W.

14*th and* 15*th*.—Rainy. Wind S. and S. W.

16*th*.—Wind W.: lowring clouds, but blowing off, and keeping dry. The lower current of clouds much fleeter than the upper.—*Query*, whether so in fact, or only an optical deception? Hard showers from 2 P. M. till night.

17*th*.—After a very wet night, rainy all the morning. Wind E. The rivers overflowing their banks. The ground as wet and spongy as in the most rainy winters. Rain daily to the

20*th*.—The third dry day this month. Wind W.

21st.—A shower at 6, another at 9 A. M.; then sun, and a brisk wind, so as to dry much hay for carrying.

23d.—The fourth dry day: a high west wind.

25th.—The fifth dry day. Wind W. by N. Barometer within two degrees of *fair.*

26th.—Cloudy, with a breeze from the south. Clear sky at 10 A. M. Hard rain late in the evening, and nearly all night and next morning.

29th.—The sixth dry day. The two following days rainy.

Retrospect of August.

25 rainy days,
6 fair ditto.
—
31

September—Set in with a more favourable omen. Wind W. by N. Barometer up at *fair,* all of a sudden. 1st, 2d, 3d, and 4th, fair.

5th.—Wind S. E.; foggy morning, then a fine bright day. Hazy evening, then a bright sun-set. Swallows flying high.

6th.—Very foggy morning; the dew visibly descending, and wetting the stones and roads. Lightned at 11 A. M. but no sunshine all day. Wind east. Dry to the

11th.—Dull morning. Rain at 6 P. M. and most of the night. Wind E. S. E.

The weather for the remainder of autumn became too variable to be here inserted.

1800.

January.—The effect of the wet and cold summer of 1799, still too manifest. In common years, the markets rise, more or less, in summer, and continue nearly the same until the wheat seedness is over, and cattle are housed; when farmers are under the necessity of thrashing to get straw for their stock, and then markets are crowded with grain; and the influx is increased by the activity of the smaller farmers, called, by way of ridicule, Boneddigion Mihangel (Michaelmas gentry), in thrashing and selling their grain; and too frequently to be bought in again, the following summer, at an advanced price. But this year, instead of the markets falling at the usual time, about Christmas, they continued still to advance. In January wheat sold for from 12*s*. to 14*s*. per bushel; by June it advanced to from 18*s*. to 22*s*.; and every species of grain, meal, and malt, in proportion. Potatoes at the time of planting were sold for from 4*s*. to 7*s*. per measure of 40 quarts heaped; which on moderate years sold for less than one half, and on cheap years for one-fourth. In good years, oats yielded one half of meal: the crop of 1799 seldom gave above one-fifth, and that of very inferior quality.

The spring and summer of this year were much more favourable than those of the preceding. The farmers had a moderately dry March, and a showery April.

April 13th.—(Easter Sunday) rainy and stormy all day; wind west.

14th.—More stormy still. The rivers more flooded than during any part of the preceding winter, followed by changeable weather to the

26th.—Wind east. A dreadful storm of hail, consisting of angular flakes of ice, rebounding to a great height as they fell. A storm of hail is generally considered as either commencing, or closing, tempestuous weather. Here it preceded nine rainy days.

May 17*th*.—Boisterous *north* wind, uncovering roofs, &c.

18*th*.—Wind west, but still high, with showers. A very windy spring altogether, which affords but an indifferent expectation for apples, &c. especially as the last year produced a vast crop. Changeable weather to June 22d. Brooks and springs suddenly dry; the weather also dry for the remainder of June, and the whole of July. Corn and pastures, on sharp soils, scorched. Observe the effect of the weather upon the earth and its produce. Springs, not known for years to fail, now quite dry. Note the inflexibility of the weather to change:

August 11*th*.—Symptoms of rain. No dew in the morning; the sun rising red; the wind veering round by east, and becoming stationary in the south. Still continuing dry, and so on to the

20*th*—When thunder produced rain, after 58 days of drought. Variable to the 23d; the 24th and 25th, dry.

Sept. 26*th*.—Wind west; a distant cataract roaring;—Cadair Idris appearing nearer than in reality; the disk of the rising sun surrounded by an orange-coloured halo; followed by rain all night, and next morning until noon. Rain daily to the 5th of October.

Sept. 29*th*.—11 P. M. a lunar rainbow; and a lunar eclipse, October 2d.

From October 6th to the 10th, rainy every day. The first re-appearance of the dried springs, which now flowed universally, after about 16 weeks stagnation. Markets in October—wheat, from 13*s*. to 15*s*.; barley, from 8*s*. to 10*s*. per bushel: they advanced in November from 18*d*. to 2*s*. per bushel; and in December still more, so as nearly to equal the high prices in June.

1801.

1801.

Jan. 8th.—Owing to the extreme dryness of the last summer, the earth is not yet thoroughly soaked; the clefts are still open, as it were expecting more moisture.

21st.—Set potatoes (early Manleys), which had previously grown five or six inches. They were dibbled into a lazy-bed of horse-dung, covered with mould; and as soon as the frost commenced, screened with a covering of pease haulm. New potatoes eatable by the 1st of May.

25th.—Wind north; hard frost; thaw in the morning; snow cleared without rain. Effects of the last summer's heat still predominant: the ground not yet nearly so wet as in other winters. Grass, turnips, &c. springing; potatoes growing, as forward as in April in common years.

Feb. 16th, &c.—What it freezes in the night, thaws in the day; which is the general character of this winter. Markets still rising, so as fully to equal the prices of June 1800. March brought more severe weather, appropriate to the adage—"*A dyv yn Chwevror, Mawrth a sych ei refr ag ev.*" What grows in February, March will use for. . .

Dry weather from March 23d to April 9th. Wheat lowering, but barley advancing, so as to be nearer in price than perhaps ever before known: wheat 19*s.* and barley 16*s.* 6*d.* per bushel.

April 13th.—Severe frost, scarcely equalled by any during the whole winter. The spring more backward, to appearance, than it was in February. The wind, stationary in the south, has no effect upon the atmosphere: its chief residence is the east.

May 13th.—Showers of hail from the N.W., which in a dry spring are considered as symptomatic of approaching rain. A frosty night following, and by morning the wind south. Rainy evening, after 33 days of dry weather.

28*th*.—Wind turned from east to west; soaking rain. The atmosphere seemingly loaded with moisture, and every blade of grass swelled with draughts of aërial nectar; the first appearance of the kind this spring.

From May 28th to June 4th, most valuable rainy weather; then dry, nearly altogether, for 31 days, to July 6th, which had a clear sky in the morning; very deep dew; hazy horizon; wind S. E. and very hard rain in the evening, succeeded by twelve days of the same kind. Prospect of crops much above common average; markets lowering.

August 14*th*.—The eleventh dry day. Corn ripening earlier than in common years. Harvest forward, even in the uplands.

25*th*.—The 22d dry day, excepting a few partial showers on the 13th.

29*th*.—The 26th dry day. Harvest nearly over, even in the later climatures of the hills. Corn getting too ripe, in a day or two, even before farmers are aware.

Sept. 3*d*.—Wind S.W. Barometer below change, and lowering: in the evening, and most of the night, hard rain, after 30 days of dry weather.

10*th*.—The eighth wet day. Late crops in bad plight. The best barometers false prophets: this rainy season they are up at *fair*.

Oct. 17*th*.—Good wheat seedness; which, in addition to an excellent harvest, lowered the markets. Wheat from 8*s*. to 9*s*. per bushel. Cheese fell one half. Thus passed two years of unexampled dearth of all kinds of provisions, which caused such an unparalleled advance in the poor-rates, that it will hereafter be a difficult task to reduce them.

November.—Sixteen days (from Nov. 4th to the 20th) dry without frost.

1802.

March.—All kinds of live stock, both fat and lean, never sold higher. Sucking pigs, of the common breed, from 30*s.* to 40*s.* a-head. Calves to be reared, at three days old, from 30*s.* to two guineas. Every kind of grain much lower. Wheat from 7*s.* 6*d.* to 9*s.* Barley from 4*s.* 6*d.* to 5*s.* 6*d.* per bushel.

From 24th of February, after a violent storm of wind and rain from the N.W., to the 11th of May—being 75 days, there were only five days showery—the other 70 days were perfectly dry. Markets still lower—potatoes for 3*d.* a peck of 24 quarts.

May 15*th.*—Deep snow. Wind north. 17th, more snow. 19th, deeper still,—full-leaved firs, &c. so loaded as to be bent to a semicircle.

20*th.*—Hard frost—garden vegetables, even fern, killed: by the 27th, after a constant, dry, and cold north wind, leaves of trees were so frost-bitten as to be easily rubbed into powder. The influenza, a general complaint over the nation.

June 3d.—Markets advancing a little, owing to the unpromising aspect of the Lent crops. Wheat crops, early sown, and on strong soils, exceedingly good.

Traeth-awyr (curdled sky) diverging from the west in the evening. Rain from the east followed in the morning. 5th, wind W. and S.W. General rain—grass springing apace.

1803.

The summer, for some time, continued wet, and somewhat cold: hay harvest, however, in the latter end of June, turned out very fine; and the weather became *settled dry*.

July 8th.—Rain all day—then dry for 13 days.

21st.—An uncommon thunder-storm—rain in large globules on the hills; followed by hail of extraordinary dimensions, which demolished, in its course, from north to south, the windows of buildings facing the storm, fields of corn, &c.

After the storm, dry for 35 days—which hastened the harvest, so as to be over, in most places, during the month of August.

Sept. 4th.—Hard frost at night—tender vegetables, French beans, potatoe haulm, &c. killed—fern, and leaves of trees, prematurely russet. Observed, in an elevated climate, that the mountain-ash, though reckoned a hardy native, was mostly affected—then the maple *(acer major)*—and 3dly, the common ash.

From July 8th to Sept. 15th, are 69 days—all dry, excepting the thunder-storm of July 21st. Not only rivulets dry, but springs also, hitherto thought perennial. Most of the springs disappeared about the 7th of October, some as early as August, and did not return till about Christmas eve. Dry summers have been common; but so dry an autumn is very rare.

Nov. 6th.—The first rainy day this autumn. Preceding symptoms—Wind veering from north, by east, to south—a lunar halo.—Nov. 4th, at night, barometer at *fair*—6th, at noon, it gradually sunk to 6° below *rain*.

In some parts of Montgomeryshire, &c. excepting on soils of the wettest kind, cattle were fed from the latter end of September, morning and evening, with hay, ash boughs, &c. for want of grass. Scarcely any aftermath to be seen; notwithstanding there were good crops of that grass in the picturesque Vale of Nanhwynain, near the foot of Snowdon, the same time. In such elevated situations, the solar heat is not so powerful—dews fall heavier—and lofty peaks may monopolise the distribution of partial showers.

Storms of rain, then snow, frost, rain, &c. in succession, after the long autumnal drought, brought on a mortality among sheep.

Winter fallows plough more friable, owing to the foregoing drought.

Markets lower than they have been for some years. Barley from 2*s*. 6*d*. to 3*s*.; and wheat from 6*s*. 6*d*. to 7*s*. 6*d*. per bushel. In common, grey pease were used to be the same price as barley; and boiling pease, the same price as wheat: but this year grey pease doubled the price of barley, and white pease doubled the price of wheat. The summer was unfavourable to those kinds of pulse.

Store pigs bought in June for a guinea a piece, in December following would not fetch above half that price. Good horses the only article selling high.

Dec. 24*th*.—Several springs, dry since August, September, and October, now re-appeared.

27*th*.—Thunder and lightning.

1804.

Jan. 2*d*.—First frost of continuance this winter; lasted seven days.

11*th to* 28*th*.—Rainy every day. Barometer below *stormy;* never known lower in these parts. 29th, rose to *changeable*, and in a few hours up to *fair*. 30th, down again to *changeable*, followed by rain.

31st.—Mild and dry; the earth verdant; more appearance of spring than frequently in the month of April. The spring herbs forward—garden shrubs out in leaf. Ash bark did not fasten on the trees this winter, as usual.

March 17th.—Cold eastern winds; spring much more backward than in the onset; fodder scarce, from 4*s*. 6*d*. to 5*s*. 6*d*. per 120 lbs.

25th.—(Palm Sunday) a halo of large diameter about the moon, at 8 P.M. followed, the

26th—By incessant snow for twelve hours.

April 12th, 13th, 14th, 15th, and 16th, new style, are called by old people, "*tridiau y'deryn du, a dau lygad Ebrill;*" *i. e.* the three days of the blackbird, and the two eyes of April, O. S. This was the best time, in the opinion of our ancestors, to sow oats. At the expiration of these five days, they expected the rawness of the weather to be at an end. But this year they would have been deceived. The adage, "*Hav tan galan, a gaua' hyd wyl Jeuan*, would have been more appropriate; *i. e.* summer till the calends of January, and winter till June. April *(Ebrill)* is a term that conveys, to a Welsh ear, an idea of reviving pleasantness, and temperate weather;—therefore old people will not have their favourite month to commence its genial sunshine and showers according to the Gregorian style; which they consider as a stretch of power, and rash presumption, endeavouring to controul the seasons. Hence their great veneration for old Christmas Day; and their expectation of old March (the tempestuous) to be ushered in with the "*fury of a lion;*"

and to go out, to make place for their revered *Ebrill*, with the "*gentleness of a lamb*."

After a cold spring, then wet succeeded; rain nearly every other day, from May 3d to the 26th.

June 3d.—The first summer day for some time past: from June 10th to the 17th, rain every day—then dry to July 2d; from that to the 6th, rainy. Crops of grain much lodged. A few hot days followed.

July 10th.—Stormy dry winds.—July 12th, the late sudden changes from sultriness and warm sun-gleams to chilling gales and stormy blasts, have occasioned an ophthalmic affection in several parts. At Tywyn and Barmouth, the natives as well as strangers have sore eyes.

14th.—Weather settled fair.

23d.—More or less rain almost every other day, rendering the harvesting of hay very precarious.

28th.—Still wet; then fair to August 4th. Dull, and a cold fog: rainy every day to the 18th, then dry to the 24th. Much hay and corn harvested; the latter, in several places, of inferior quality, owing to *mildew*.

Dry weather continued to the beginning of October. Springs nearly as dry as in the autumn of 1803. Cattle suffering much for want of water. Markets rising; owing to the blight, wheat selling from 9*s*. 6*d*. to 11*s*. per bushel.

SECT. IV.—SOIL AND SURFACE.

HAVING, in the 2d Section, given the *political* divisions of the district into six counties; here, in treating of soil and surface, some more discriminating divisions will be necessary; such as are traceable on the map of nature, and definable by the rules of geology.

A line commencing at Pumlumon on the south-eastern boundary of the district, and running north-westernly between Llanbrynmair and Carno, to Llyn Gwyddïor lake; then to Bwlch y groes near Aran Vowddwy, to Drws y Nant, between Bala and Dolgelleu; and crossing the mountains to Llyn Trywerin and Llyn Morwynion; and terminating near the source of the valley of Festiniog: may be called the *Back-bone* of the counties of Montgomery and Meirionydd. A person may walk this line, of 50 miles extent, without crossing a rivulet; as it is the parting ridge of the eastern and western streams. A farm-house on this line, near Drws y Nant, is so situated, that the rain-water which falls on the western side of the roof flows into Cardigan Bay at Barmouth, and that which falls on the eastern side flows into the Irish Sea at Chester Bar.

The main streams on the western side of the ridge, are, 1. the *Dovey*, passing through the valley of Machynllaeth; 2. the *Maw*, watering the valley of Dolgelleu; and 3. the *Traeth-bach* river, flowing through the valley of Festiniog.

On the eastern side of the Back-bone, are the sources of the Severn, Vyrnwy, Tanat, Ceiriog, Dee, and several other secondary streams; taking, in general, a parallel course towards the plains of Salop and Cheshire.

On both sides the ridge, the southern vallies are more extensive, and consist of better soil, than the northern: as for example, the valley of Dovey excels those of Dolgelleu and Festiniog, on the western side; and so does the Vale of Severn those of the Vyrnwy, Tanat, Ceiriog, &c. on the eastern. The reasons are obvious. Vallies were originally excavated by the irresistible force of water; and the present soils which cover their primitive surfaces, to various depths, were deposited, from time to time, by the more gradual and milder agency of the same element. It is moreover evident, that vallies are fertile, or otherwise; have depth of soil, or not; according to the quality, and distance, of the hills from which their respective rivers flow. Limpid streams issuing out of primitive mountains, consisting of siliceous masses, cannot be expected to deposit much sediment to enrich the dales they rush through. Whinstone and chert diminish but little by the abrasion of water; and where the descent is rapid, water is more likely to take from, than add to, the staple of the soil.

The substance of the Pumlumon, or Severn, range of hills is, chiefly, an homogeneous shale, becoming friable in the air, and easily abraded by water, and in all probability contains but few ores of metals; therefore when held in solution, and afterwards deposited, by water, it becomes the genial matrix of vegetation. Northward from the Severn vale, the mountains retain their shaly and friable character,—a few insulated rocks excepted, quite up to the Vale of Vyrnwy; where, on the north side, the grey, semi-indurated, mountain rock commences, and continues, still northward, to the Vale of Tanat, which received its soil by depositions from the Berwyn range of mountains, consisting of argillaceous schistus. Thus it may be seen that not only the fertility of the soil, but also the extent of a vale, depends upon the nature and quality of the mountains and rocks by which they are surrounded. The Severn vale acquired its present superiority of extent and fertility, over those more northern, owing to the facility with which the diluvian tides excavated the friable shale of its surrounding eminences. This hypothesis will bear also on the western side of the Back-bone ridge: to the north, the mountains consist of harder species of rock, and the vallies are narrower, and less fertile; the valley of the Maw is inferior to that of the Dovey, &c.

All vallies, at their sources, where the streams flow rapidly, have invariably a light gravelly soil; and the longer and wider the vale extends, and the nearer a level the waters flow, the richer and more loamy will be the sediment.

This subject may be farther illustrated by tracing another line, from south to north, across the whole of the district, from Cardigan Bay to the Irish Sea. Begin the line at the estuary of the Dovey;—follow that river up to its source, near Aran Vowddwy;—then take the Twrch from its spring to Bala-lake;—then the Dee to its confluence with the Trywerin;—then that river to its head at Trywerin lake;—then Conway from its source at Llyn Conwy, during its whole course through the Vale of Llanrwst, to its estuary near Orme's Head. To the *west* of this line, the Meirionyddshire and Caernarvonshire mountains are, in general, of the primitive siliceous kind, rugged, steep, and barren: to the *east*, the Montgomeryshire, Meirionyddshire, Denbighshire, and Flintshire, mountains, are chiefly argillaceous; excepting the eastern and northern outskirts, which abound with calcareous rocks, freestone, and chert: these, however, are generally covered with grasses, fern, or heath.

The valley of the Conway, like that of the Vyrnwy, is of a secondary character; having the steep primitive rocks of Caernarvonshire to the west; and the sloping argillaceous hills of Denbighshire on the east. Its parallel in point of bearing is the Vale of Clwyd; both running, in a transverse direction to those of Montgomeryshire, from south-east to north-west. It is, however, inferior in extent and fertility to the Vale of Clwyd; for the same reasons as have been already given, why the Vale of Severn excels those of the Vyrnwy and Tanat. The chief substances of the hills surrounding the Vale of Clwyd are, argillaceous shale, sandstone, limestone, and decomposed limestone or marl; all excellent components of fertile soil.

Anglesey is the only county in the district that has any claim to uniformity of surface, and general character: the whole of its circumference is washed by the briny wave; its surface is gently undulated, having, comparatively with other counties, but few swellings that merit the appellation of hills. It has, however, varieties of soil. Mr. Rowlands, in his *Ideæ Agriculturæ*, enumerates five different species, which may be seen from Holy Head to Beaumaris; namely, 1. friable mould;—2. shallow soil, on light sand;—3. coarse heathy soil on rock;—4. quick lively soil, invigorated by marl;—5. a reddish loam.

The promontory of Lleyn in Caernarvonshire, opposite Bardsey Island, bears a greater similarity to Anglesey, than to any other part of the district, in most of its general characters;—surface, soil, climate, course of tillage, implements, live stock, &c. Lleyn, however, is inferior to Anglesey, in not being stored with limestone.

Some Account of the several Ranges of Mountains within the District; their Bearing; Elevation; Species of Rock of which they are generally composed; Surface, &c.

1. The *Snowdon* range commences in a most tremendous precipice overhanging the sea at Penmaen Mawr; and, in a *south-west* direction [*], takes in its course Carnedd Llywellyn, the Peak of Snowdon, a long tract of mountains to the south of Llanllyfni, and terminates in the lofty and triple-peaked Reivel [†], whose base is washed by the waves of the Caernarvon Bay. The geometrical length of this range, following the zig-zag directions of its summits, is 40 miles: the distance be-

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[*] From this point to south-east is the general bearing of the greater ranges of mountains, not only in this district, but in the whole of our island. Other terrene substances may be found, bearing towards the same point: tracts of flint and chalk, coal, limestone, ranges of slate quarries, beds of ores, tracts of reddish sandy soils; and even single veins of grey limestone, from two to three feet thick, more or less, may be traced, cutting their way through argillaceous rocks, for scores of miles, towards the south-west. Indulging theoretic speculation a little, from south-west to south-east may be the general bearing point of islands, promontories, mountains, &c. not only throughout the continent of Europe, but also from the arctic circle to the northern tropic. Between the tropics, a new arrangement of bearing may take place; and, beyond the southern tropic, in the South American and African promontories, and in New Holland, a third general angle of bearing may be found. This theory, time and observation must either confirm or explode. However, the line of bearing of mountains, minerals, and fossils, in this island, is too uniform and striking to be passed by unnoticed. How wonderful are the arcana of creation, and re-formation! But wonderful as they are, they are but Gordian knots, easily cut by the Buffons and Huttons of the day! Inexplicable difficulties are calculated to make geologists fools, and perhaps fools geologists.

[†] In Welsh, *Yr Eivl;* in allusion to its furcated outline.

tween its extreme points, in a straight line, about three-eighths less. Upon this range, the *Wyddva*, commonly called the Peak of Snowdon, is the highest; its altitude above the level of the sea, according to the mensuration of Mr. Evans*, being 3568 feet. The second in height is *Carnedd Llywellyn*, 3520 feet: though some old men in that neighbourhood are highly displeased, and take it as an insult to their nation, when strangers suppose that any peak in Snowdon can be higher than that, which bears the name of their favourite Prince, *Llywellyn* The loftier summits of this range are composed of various primitive aggregates of the siliceous class, forming several varieties of granitines and porphyries: these are again abutted, on both sides, by immense beds of slate; and the slate, upon the *Menai*, support strata of limestone. The skirts of the granitose mountains also frequently abound in chert, quartz; and in some places with burr-stones, serpentine, &c. Of ores, this range seems to contain more copper than lead. Neither rain, frost, nor any atmospheric agent, being able to decompose these rocks, their sterility can induce no wonder. The hollows and slopes, upon peat or clay, are the chief spots upon this range which produce any herbage for the support of the hardy race of sheep and cattle, which have their summer runs upon this alpine tract.

2. The *Berwyn* range takes its rise near Chirk Castle in Denbighshire; takes a parallel course with the Snowdon range towards the *south-west;* proceeds to the lofty summits of Cadair Verwyn, Trum y Sarn, Aran Vowddwy, and Cadair Idris; it then makes a rapid

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* Author of the six-sheet Map of North Wales.

descent of 2850 feet, within the space of twelve miles, and plunges into Cardigan Bay at Sarn y Bwch *.

The

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* *Sarn y Bwch*, is a ridge of huge stones, covered by the tides, and appearing at low water, near the mouth of the Dysynni. *Sarn* signifies a causeway or pavement; and this, as well as another near Harlech, called Sarn Badrig, are supposed by some to be the work of art: others take them to be skeletons of hills, reduced into their present state by the repeated operation of the tides. The oracles of the cloister would fain have persuaded the credulous of those days, when superstition was in its zenith, that the latter *Sarn* was a footpath miraculously formed by St. Patrick, to expedite his passage to and from Ireland. It is moreover said, with much greater probability, by the assertors of its being the work of art, that it formerly was the north-western barrier of *Cantre'r gwaelod*, or the hundred townships of the plain; which extended from thence over a vast tract of Cardigan Bay towards Aberystwyth. That this part of the sea was formerly dry land, seems to be well attested by immemorial tradition: the catastrophe of its being deluged, is also recorded in ancient verse, preserved in a very old manuscript called the *Black Book of Caermarthen.* The inundation is said to have happened about the year 500, owing to the negligence of a drunkard of the name of *Seithennin;* who, in the night, left the sluices of the embankment open. The baron of the manor was Gwyddno Garanhir, father to Elphin, patron of Taliesin, prince of the bards of the west. There is a collection of loose stones, in the sea, seven miles to the west of Aberystwyth, called Caer-Wyddno, the fort or palace of Gwyddno; and adjoining to it are vestiges of the southern embankment, called Sarn Gynvelyn; both of them dry at low water, spring tides.

There are also physical appearances now existing, which seem to corroborate what is asserted by tradition and history respecting this inundation. Trees are observed to lie prostrate in the bay. Between Tywyn Meirionydd and Aberdyvi, a turbary, of excellent peat, extends under the sea to an unknown distance. The people dig through several feet of the sand, which the sea has deposited upon the surface of the turbary, in order to get at the peat. The flame of this saline fuel is so pungent, that it corrodes vessels hung over it in a short time. The sea, over the whole extent of the bay, is not deep. About the year 1740, Mr. Lewis Morris copied the inscription of a stone found in the sea, about 100 yards below high-water mark, near Barmouth. The stone is of the siliceous

The geometrical length of this range is 54 miles; and a straight line from point to point would measure 49 miles.

The elevation of Aran Benllyn, from Dolgelleu, is 2760 feet; of Cadair Idris, 90 feet more.

The north-eastern extremity of this argillaceous range is abutted with the Vron and Brouygarth lime-rocks; has some quantity of chert near Llechrydau; it then continues schistose, or stratified, until it reaches Aran Benllyn and Aran Vowddwy, conspicuous eminences of the siliceous kind; which species of rock continue, more or less adulterated, through Cadair Idris, to its termination in the sea. This range has hitherto been found richer in lead than copper.

There are but few slates for the covering of buildings,

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ceous whin kind; about seven feet long, and two broad. The first line, CÆI BXTi—, is still legible; but the MONEDO RICI in Mr. L. Morris's reading, is now nearly obliterated. Another block of whin was lately discovered there, on spring ebb, and brought to the beach; with an inscription, ÆTERN ET ÆTERN, quite legible. In the sands, near the spot where these stones now lie, were discovered, in the year 1798, 29 Roman coins; one Domitian of brass, the rest of silver: some belonging to Vespasian, others to Domitian; and one to Nero Claudius Drusus, the elder Germanicus.

A great part of the Vale of Tywyn seems to have once been an accession to the empire of Neptune. Some time after the inundation, the sea in its turn began to recede; and, as it gradually retired, left a beach of gravel. When it approached its present limit, it cast up a higher bank than usual; and consequently the derelicted plain, by stagnant water and decayed vegetables, acquired a covering of peat soil of from five to seven feet depth, upon the surface of the gravel left by the sea. This substratum of gravel greatly facilitated Mr. Corbet's draining the turbary, (of which see more in its appropriate Section); for on cutting a drain around an enclosure of about ten or twelve acres, to the depth of six or seven feet, the bed of gravel, left by the sea, was universally found; and by the gravel's capacity of disposing of the water, the enclosed area, without any intermediate drains, was effectually dried.

and other purposes, raised in North Wales, besides what are quarried out of the Snowdon and Berwyn ranges. In the former, slates are raised, first, between Conway and Bwlch y ddeuvaen; at Trevriw; at Lord Penrhyn's quarries near the Ogwen; further on to the south-west, in several of the Llanberis and Llanllyfni hills; and near Ffestiniog in Meirionyddshire. In the latter, or Berwyn range, slates are raised, first, at Oernant; Glyn Ceiriog; at Maen-Gwynedd near Cadair Verwyn; Llangynog; Dinas Mowddwy; Moel-Grychan near Aberllefeni; at Gogarth; and at Peniarth uchaf, between Cadair Idris and the sea.

The surface produce of this range is, first, fern and whin or gorse (*ulex*) upon the lower and drier outskirts; heath upon the loftier summits of argillaceous schistus, rooted in shallow peat upon clay or rammel; rushes, and varieties of mosses, and alpine aquatic plants, on the humid slopes and hollows, upon various depths of peat.

3. The *Severn*, or ***Pumlumon***, range, commencing at Breddin Hill, on the boundary of Shropshire, and comprising the Long Mountain to Nant-Cruba; then extending from Montgomery Castle along the Kerry Hills, whose summit-line is the boundary of North and South Wales, to the Llangurig Mountains,—terminates at the sources of the twin-rivers Severn and Wye. The two extremities of this range are 37 miles distant; but the line of the summit, curving towards the south, forms an arc of a circle 49 miles in length.

Breddin Hill is 999 feet above the level of the Severn; is chiefly composed of a greenish serpentine, and Moelgolfa, its south-western extremity, contains some burr for mill-stones; and further on, towards the Long

Mountain, grey limestone, calcareous spar, and other fossils, foreign to this tract of country, appear; but they are of short continuance. Shale seems to be the major component of the whole range; though in some places beds of more compact and more regularly stratified stones are found, which are raised and used for flooring, grave-stones, &c. The tract about Breddin, by the singularity of its general character, induces the supposition that it contains metallic ores. Some ore of cobalt has been found there. Lead ore has also been raised in the other extremity of the range, near Llanidloes; but upon the whole it seems to be the most unpromising of all the ranges, for mine adventurers. However, it is more permanently valuable than mineral tracts, which, for a season, enrich a few individuals only, and then entail beggary upon the rest of the neighbourhood.

The general character of the Severn range is, a regularity of outline, gradual slopes, and rounded summits; and being chiefly composed of a brittle shale, it affords a continual addition to the staple of fertile soils. Its surface, uniformly covered with herbage, supports numerous flocks of fine-woolled sheep.

These three ranges, and their dependent, or secondary wings, occupy the greater part of the whole district. The *first*, or *siliceous* range, occupies nearly the whole of Caernarvonshire. The *second*, or *primitive schist* range, riseth in the south-eastern part of Denbighshire; takes in a part of Shropshire and Montgomeryshire; and then, the whole length of Meirionyddshire, to the sea. The *third*, or *shaly* range, extendeth the whole length of Montgomeryshire; its summit line serving as a boundary between it and the counties of Salop, Radnor, and Cardigan.

In elevation, the three ranges observe due subordination. Majestic Snowdon, and its granitine tribe, takes the lead;—then Cadair Idris, and its connected subjects, occupies the centre; and lastly, humble Pumlumon, and its extensive train, brings up the southern rear.

These three ranges, as before noticed, run parallel, from north-east to south-west. To complete the whole mountainous tracts of the district, another anomalous range must be described: which is,

4. The *Clwydian* and Hiraethog range. It is of the shape of the Roman letter U; the two wings, or sides, running parallel, though in a transverse direction to that of the other three ranges, from south-east to north-west. The Clwydian, or north-eastern wing, commences at Diserth, in Flintshire; and proceeds through the parishes of Cwm, Dinmeirchion, Caerwys, and Yskeiviog, to the valley of Nannerch. Hitherto, the main mass of the range consists of limestone, rich in ores of lead and zinc; but beyond Nannerch the hills are loftier, and their argillaceous summits are abutted on the east by the Flintshire lime-rocks; and towards Moel Accre are also abutted, on the west, by the lime-rocks of Denbighshire, on the verge of the Vale of Clwyd. Here the range assumes a varied character; in one place an isolated limestone rock, in another an argillaceous mass; and so on, interchangeably, through Jal, Minera, the Vron-deg Hills, Eglwyseg lime-rocks, Oernant slate-quarries, and Cefn du, to Bryn Eglwys; having by this formed the curve line, which connects the Clwydian and Hiraethog wings.

The latter wing commences in the argillaceous hills above Derwen; and from that to Eglwys Vach, on the river Conway, its north-western extremity, it forms one of the most extensive and dreary waste in the principality; being from 25 to 30 miles in length, and of various breadths from five to nine miles. It chiefly consists of shale, besides grey mountain rock, or semi-indurated whin, and flags for flooring, and tomb-stones. This wing, like the former, is abutted on the east by rocks of limestone, on the western verge of the Vale of Clwyd, proceeding from Coed Marchan near Ruthin, to Denbigh, Henllan, Cevn Meriadog, Llysvaen, and the two Orme Heads, overhanging the sea. On the western side, this argillaceous range is intersected by narrow veins of grey limestone; which run, transversely to the direction of the range, in their usual course from north-east to south-west. Heath, or ling, is the general covering of this vast tract. The hollows and flats abound with good depths of excellent peat for fuel; which is so close grained, that it exhibits a polished surface when dry, and cut with a sharp-edged tool. The area, or level tract, included between these two wings, is the rich and beautiful Vale of Clwyd. Both wings, including their connecting curve from Minera to Bryn Eglwys, measure upwards of 60 miles in longitudinal extent.

Varieties of Soils—where chiefly found, to a considerable Extent, within the District.

1. STRONG LOAMS—*excellently adapted for the Culture of Wheat, Beans, Cabbages, &c. and for Permanent Pasture.*

Lower parts of the Vales of Severn and Vyrnwy, with their outskirts bordering on Shropshire;—the vicinity of the Dee, adjoining Cheshire;—the Vale of Clwyd, below Ruthin;—the maritime coasts of Prestatyn, and Abergeleu;—the banks of the Conway, near Marl, and up the river towards Maenan and Trevriw;—the shores of the Menai, opposite Llanvair-is-caer and Llanidan, &c.

2. Free Loams; *adapted for the general Purposes of Tillage.*

Patches interspersed among, or adjoining, the stiff loams just specified;—the middle parts of the larger vales;—the lower parts of the smaller vallies;—the Vale of Clwyd above Ruthin;—the valley of Llanrwst above Trevriw; the interior parts of the Isle of Anglesey, and Lleyn;—particular spots in the vallies of Tanat, Cain, Edeyrnion, Dovey, &c.

3. Light Soils; *consisting of various Admixtures of Sandy Loam, Rounded Pebbles, Shivery Gravel, Peat, &c. adapted peculiarly for the Culture of Barley, Pease, Turnips, &c.*

These abound in the vallies, especially near their sources;—on the slopes of vales with a southern aspect;—shallow, but grateful, soils, on limestone;—the greater part of Lleyn and Anglesey; the marine coasts, or semi-vales, of Aber, and Ardudwy, &c.

4. Sandy Soils;—On the estuaries of the principal rivers;—wastes on the sea-coasts, &c.

5. Ferny Soil, or Hazel Mould;—Spots intermixed with soils of the foregoing descriptions, in every part;—sides of the inferior hills, producing fern, broom,

and the larger ulex or gorse *, and underwood, especially the hazel and hawthorn, &c. Lime produces greater effect upon this kind of soil, perhaps, than any other; owing to the great quantity it contains of vegetable matter, roots, &c. for the lime to act upon. It is of various colours, according to the portion of carbon it has obtained by the dissolution of decayed vegetables, &c.

6. *Till, or Hungry Light Mould, tinged by the Orange Oxyd of Iron:*—On hills of slate, or shaly schistus;—on slopes of the inferior vallies, productive of the mountain ash, birch, and the lesser or dwarf ulex, or gorse, &c.

7. PEAT, OR MOSS.—This soil, taken in the aggregate, occupies a great portion of the district; and is found at all elevations: it is dug from under the sands at Tywyn Meirionydd, several feet below the high-water mark; and is found at the height of upwards of 3000 feet, on the summit of Carnedd Llywellyn. It is found of the greatest depth on flats and hollows favourable for its production; of lesser depth upon moderate slopes, upon clay or rammel, and such substrata as do not admit the filtration of water. This latter is generally covered with a coarse matted herbage, which characterizes what is provincially called *rossy*

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* The old saying is—

"Under a broom-stalk, silver and gold;
"Under a gorse-stalk, hunger and cold."

This must refer to the lesser kind of gorse; the dwarf ulex, and a third species, called by some hen-gorse, and by the Welsh *eithin y gath*, or cat-gorse; an infallible sign of a cold hungry clay. The larger ulex flourishes upon sound and deep hazel mould.

land *(crawcwellt)*. This kind of surface is sometimes pared and burnt for a crop of rye, where the elevation is not too bleak, and then limed, or otherwise manured, for oats; and laid down with grass-seeds. The dry argillaceous mountains have, generally, a thin coat of light peat, upon a substratum of till, or of shale; and are over-run with heath *(erica vulgaris)*.

Notwithstanding immense mountainous tracts are of this description, yet the attempts to improve them have been inconsiderable; excepting a few pieces on the Henllan enclosures, in Denbighshire. As they are mostly crown wastes, their improvement is scarcely to be expected. On sheep-walks, where overgrown heath has smothered every other species of herbage, the shepherds in some places, on dry summers, taking advantage of the course of the wind, set fire to the standing heath, and reduce scores of acres to ashes. This conflagration is called by the Welsh, *llosgi poethwal.* The tender shoots of the new heath, permitting a few natural grasses to spring up with them, are better relished by the hardy stock which depasture these alpine tracts; but the improvement can be but of short duration; heath, recovering its wonted vigour, soon ejects every vegetable intruder from this its native soil. About Buxton, and other parts of Derbyshire, heathy sheep-walks are brought to produce natural trefoils, in good abundance, by a plentiful top-dressing of lime. The skirts of the Hiraethog Hills adjoining the Clwydian tract of limestone, might, apparently, be improved in the same manner, were the sheep-walks, belonging to the respective farms, appropriated and enclosed. The north-eastern wing, called, in this Report, the Clwydian range, lieth also contiguous to the Flintshire limestone; and in one respect is more advantageously situated than the Hiraethog wing, by having coal for burning lime within a moderate distance. Where *lime* is at too great distance, *paring* and *burning* might be resorted to as a substitute.

In Mr. Middleton's Report of Middlesex (p. 298) an instance is recorded how the Rev. Mr. Cooke, in the month of April 1792, burnt the sods all over the surface of a plot of black peaty earth, producing heath, in the state in which they were left by the paring-spade, without collecting them in heaps in the usual method. Some other avocations then prohibiting him from pursuing his intended mode of tillage on this piece, it lay neglected. In about a month after, when he went to view it, he was agreeably surprised in finding incipient vegetation taking place, which improved to a luxuriant and permanent grass*. Mr. Cooke accounts for this spontaneous production, by the sods being burnt regularly all over the surface instead of in heaps, and never suffering it to burst into flame sufficient to exhaust the saline ingredients of the vegetable soil.

This discovery, like many others the offspring of chance, merits further experiments; especially on heathy soils, distant from lime. Were the paring not sufficiently deep, or the fire not vehement enough, to check the reproduction of heath in a few years, that would not be a material objection, in elevated situations, and where the heath-stalks are not over-numerous; as scattered tufts of this flowering plant would screen and improve other species of herbage.

Notwithstanding the varieties of soils here described, are the most prevalent in the parts respectively specified; yet intermixtures of soils, in separate patches of few acres, and sometimes of few square yards, are frequent. In some places, almost every farm consists of varieties of soils; one field having peat on the surface; the next, clay; the third, gravel; the fourth, loam, &c. and these of various depths, from nine inches to as many feet. In the lower vallies, loam generally rides upon gravel; on slopes the order is frequently inversed; loams being found, at considerable depths, beneath inferior surfaces. Sandy loam, nearly equal to recent river sand for making mortar, is frequently found on elevated situations; the several layers of which are so easily definable, that a Neptunian geologist would not hesitate to pronounce, at how many tides so many feet depth of sand became there deposited. The division lines between the several layers are, generally, of the same form, whether rectilineal, curvilineal, or serpentine.

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* Did not this spontaneous grass consist chiefly of varieties of trefoils?

The district is entirely destitute of *chalk;* and the same may be very nearly said of its accompaniment, *flint*.

The Isle of Anglesey; the Caernarvonshire shore of the Menai; the tracts adjoining the Denbighshire and Flintshire ranges of limestone;—are benefited by abundance of marly soils. Meirionyddshire and Montgomeryshire have no marl.

Tracts of reddish soils are neither numerous nor extensive within the district. A reddish loam occupies the banks of the Menai, about Llanidan, in Anglesey. Parts of the Vale of Clwyd have their soils tinged by a substratum of a reddish, loose-textured sandstone; from which, probably, the borough town of Ruthin and Rhuddlan, as well as the county of Rutland, derive their names.

In the eastern part of the district, a reddish light soil, occasioned by the contiguousness of the same coloured sandstone, extends from Cheshire, touches Wales at Holt, on the Dee; crosses the Ellesmere tract of Shropshire; touches Wales a second time, near the Llanymynech lime-rocks; proceeds in a south-west direction to Guilsfield, Powys Castle, Nant Cruba; and so on, through South Wales, to Milford Haven.

Land, according to chemical agriculturists, considered as the basis of vegetation, is called *soil*; and the more fertile soils consist of a due admixture of the primitive earths, especially the calcareous, siliceous, and argillaceous. In this district, although there be instances, in several of the vales, of such due admixtures; yet, in most other places, Nature seems only to have brought together the materials in detached masses, and left to the skill and industry of man to mix and form them into fertile soil, by the rules of alligation-agricultural. These rules, however plain, are not sufficiently attended to. There can hardly exist a peasant who does not know that clay gives cohesion to sand and gravel; and, on the contrary, that the latter diminish the superabundance of that quality in the former: why then do they not reduce their knowledge to practice; since the separate ingredients of fertile soil are frequently laid by Nature so conveniently to their hands?

SECT. V.—MINERALS AND FOSSILS.

Ancient Mining.—Ores of tin, lead, and iron, have been raised in this island from very remote antiquity, by the native Britons; as they are mentioned by Strabo[*] among the articles of exportation. The ores of copper, and zinc, were probably the discoveries of the more skilful Romans, after their conquest of the island; and with both united they made brass. The several methods of working the mines were,—1. by cutting open *trenches*, to discover superficial veins, or beds of shode ore:—3. by sinking *shafts*, the *putei* of Latin authors: and,—3. by driving *levels*, the *cuniculi* of the same writers. Fuller, in his Worthies of Wales, attributes only the first, or trenching method, to the Romans; the second, or sinking shafts, to the Saxons and Danes; and adds, that the third method, or driving levels, was not in practice until within about half a century of his time[†]. But on this point the facetious author must be incorrect. The Romans (saying nothing of the other nations), were too sagacious and skilful to play such a superficial game. The vein of ore, once discovered by trenching, would be, by them, pursued into the very bowels of the earth; and, as Pliny strongly expresses it[‡], into the regions of departed spirits. They wanted, 'tis true, the potent aid of gunpowder; but they had other effectual, though less expeditious, methods. Fire and water[§] were their auxiliary miners. The rock being first intensely heated, water was either poured, or conveyed, where practicable, by pipes, into its crevices; and the effect may be easily judged; especially in limestone rocks, where the richer mines generally are found. Where the ignition had been sufficiently vehement to disengage the two component gases of the infused water, they may, in their escape, display an expansive force, similar, though in a smaller degree, to that of gunpowder. The effect of hydrogen, one of the ingredients of water, in spontaneously producing dreadful explosions in mines, has been too well known*.

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[*] Lib. iii. 265—lib. iv. 305.

[†] Fuller died in 1661.

[‡] "Imus in viscera ejus (telluris) et in sedes manium opes quærimus." —*Proem.* lib. xxxiii.

[§] Pliny, lib. xxxiii. c. 4, says vinegar. Livy is discredited for making Hannibal use vinegar, for similar purposes, in his passage over the Alps. Modern criticism may controvert Pliny, as well as Livy; and, in both, substitute *acutum* for *acetum*; and give the miner a steeled pick-ax instead of vinegar.

The ancient British smelting-hearths, where the ore and the wood-fuel were intermixed, are still discovered by their slag contents, in different parts of the country; having acquired a surface of soil, and some of them covered with trees and underwood. They are sometimes found in parts, where no other traces of mining now appear. That the ore was conveyed, to be smelted there, from distant parts equally as well supplied with fuel, along bad roads, and over high hills, cannot be credited. The conclusion then is, that the ore must have been raised near the spot; and wherever these ancient hearths are found, the vicinity is a favourable field for mine adventures. The scoriæ of some of the hearths are more perfectly reduced than those of others. The slags are found not worth the re-smelting: but the spots where the ores were deposited ready for the smelter's use, frequently contain fragments of lead ore in such quantities, as lately to have encouraged washers of ore to collect them. By this means, scores of tons have been recovered, in Flintshire, and at Dol y velin blwm, near Llanfyllin, in Montgomeryshire. The Romans improved upon British smelting, by erecting furnaces for the purpose. The scite of one of them is supposed, by Mr. Pennant, to be at Pentre Ffwm-dân, near Flint. At Cwm glan avon, near Llangynog, is a ruin, fourteen yards long by seven broad, called *Cubil*. The oldest miners in the neighbourhood are ignorant as to the use of it. There are quantities of scoriæ adjoining. It stands at the base of a rock, containing ores of lead, copper, and calamine; and, on the opposite side of the valley to the great lead mines belonging to the Earl of Powys. On the top of the mountain, to the north of it, is a deserted lead mine, called *Craig y mwyn*, or the *oary cliff*, bearing marks of very ancient mining, by the assistance of fire and water: here a company, lately, raised several tons of lead ore. Within a few hundred yards of the *cubil*, there is a level, called the *ogo*, or cave, driven under a vast depth of slaty rock. Wherever a mining level is called by this name, as here and at Llanymynech, it indicates the antiquity of the work; the natives having, by length of time, forgotten that it was the work of art, and giving it the appellation of a natural fissure. However, not presuming to give this *cubil* a very remote date, it may probably be ascribed to the reign of Elizabeth, when the art of metallurgy was revived,—societies were formed for the encouragement of providing materials, by royal authority;—and it may be presumed that this spot, among others, had assayers, carrying on the process of cupellation *.

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* The most dreadful instance, perhaps, upon record, is that which took place in a coal-pit at Mostyn in Flintshire, February 3, 1675; and is related at large in the Philosophical Transactions, No. 136. The quantity of gunpowder necessary to display such an extraordinary force as this effected by hydrogen liberated, can scarcely be calculated. It is called by miners, &c. *fire damp*, to distinguish it from the *suffocating damp*, or azot.

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* Extracting silver from lead ore, &c.

Ores are discovered at various depths, and in various positions. *Float ore*, called by miners gravel ore, consists, generally, of nodules of lead ore, from the size of a small nut, to blocks of 30 and from that to 40 tons weight; dispersed irregularly near the surface, in gravel, loose earth, or clay. Some ore of this kind was lately raised on the limestone rocks at Llanymynech. It is the most profitable of any, as long as it continues; the expense of obtaining it, comparatively, small; and the nodules are, frequently, of pure ore*. Of these superficial ores, it may be presumed, our Roman visitors took a good share.

Veins are of various kinds. The most common are the *rake* veins, which are fissures of various breadths, generally running across the strata of the rock; though sometimes parallel to them; and, most commonly, of an unknown depth. The Llangynog vein was worked, profitably, to the depth of 90 yards, and upwards; some in Flintshire to 100, and from that to 150 yards, and the barren fissures still continuing open. It is probable they extend the whole depth of the rock in which they are found; whether limestone, slate, or chert. *Gash veins*, whose sides *con*verge from the surface downwards, must close at a given distance; the above hypothesis relates to veins whose sides *di*verge from the surface downwards; and are the richest, as well as the most common. Sometimes, in the language of miners, veins "crop out to the day;" and a rustic, by chance, may discover them. Llangynog vein is said to have been discovered by a shepherd, running after his flock, and treading upon the slippery surface of a flake of ore: the moss giving way under his wooden shoe, the glossy ore appeared. The great Grosvenor mine at Halkin, is reported to have been discovered by a peasant cutting a ditch-fence.

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* *Float* ore is distinguishable from *shode* ore, only by its fragments being rounded, apparently by attrition and great force of water. Shode ore is in a more entire, or original, state.

The rake veins are seldom perpendicular, but incline variously from 50 to 80 degrees.

Pipe veins are of two kinds, vertical, and horizontal. The *ogo*, or ancient level, at Llanymynech, is of the latter description. It consists of caverns of unequal size and shape, connected, originally, by strings of ore, which served as guides for the miners to pursue the ore from one cavern to another.

Ores of Metals—1. *Copper.*

In respect to the number of miners employed, and the quantity of ore annually raised, the Mona and Paris copper mines, in Anglesey, claim the earliest notice. In fact they are but one mine, distinguished by different names, to discriminate different properties. The Mona mine is the sole property of the Earl of Uxbridge; and the Paris mine belongs to the Rev. Mr. Hughes. The late T. Williams, Esq. M.P. for Marlow, had a share in each; and conducted both, for several years, with peculiar skill and success.

Although Paris Mountain bears symptoms of being worked in ancient times;—although the transmutation of iron into copper is said to have been attempted in Dorsetshire as early as the year 1571[*];—although in eight years afterwards, in the year 1579, a Mr. Medley was employed by Lord Treasurer Burleigh and his partners *, to precipitate copper from its solution in the vitriolated waters of Paris Mountain, and seems to have actually succeeded in the process †;—although Dr. Brown published the Hungarian method of recovering copper from such solution by the agency of iron, which he saw practised in the Herrngrundt mines near Newsol, as far back as the year 1673;—and although the same supposed transmutation was discovered by accident some time after in the Arklow mines in Ireland;—yet after such successful experiments had been made on the spot, and such satisfactory light had been thrown upon the subject in different quarters of Europe,—this immense treasure of copper at Paris Mountain lay concealed until late in the eighteenth century. Although Bishop Humphreys of Bangor, in a letter dated April 6th, 1698, mentions Paris mines, under the name of the Prince's mines at Trysclwyn ‡;

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[*] Hutchinson's History of Dorsetshire, vol. ii. p. 110.

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* They were the Society for the Mineral and Battery Works, incorporated by a patent from the Crown, in the year 1568; and consisted of the Lord Treasurer, the Duke of Norfolk, the Earls of Leicester and Pembroke, Lord Cobham, Sir Francis Walsingham, Sir Nicholas Bacon, and others. See Stringer's *Opera Mineralia explicata.* 1713.

† See Letters from Sir John Wynne of Gwydir to Lord President Eure, on this subject, in the Appendix to this Report, Nos. III. and IV.

Speed, in his Description of Anglesey, notices Medley's experiment, and says—"like unflesht soldiers they gave over their enterprise, without further hope; because at first they saw it not answer their over-hasty expectations."

Fuller, in his Worthies of Wales, p. 20, adds—"If this project was founded on rational probability (which I have cause to believe) I desire the seasonable resumption thereof, by undertakers of as able brains and purses, but more patience than the former, as a hopeful forerunner of better success.

‡ *Mynydd y Trysclwyn* was the ancient name of this hill of copper: but how it came to be called *Paris* Mountain, has been a subject of much and vain etymological speculation. In the above-mentioned letter, the Bishop labours

—yet the trials were so repeatedly and unaccountably unsuccessful, that, in the year 1747, when Mr. Lewis Morris, a native of that neighbourhood, published his book of charts, Paris Mountain was not supposed to afford any other mineral fit for exportation than a brown ochreous earth. Dr. Linden, in his Treatise on the Mineral Waters of Llandrindod, in Radnorshire, published in 1756, notices a mineral spring at *Trysclwyn*, "turning syrup of violets red, being no chalybeate whatever."

In 1762, a Scotch miner of the name of Fraser came into Anglesey in quest of ores. Paris Mountain was fixed upon as the most promising place: shafts were sunk, and copper ore was discovered; but water soon overpowered the adventurers. In 1765, the Macclesfield Company leased the lead mines at Penrhyn dû in Caernarvonshire of Sir Nicholas Baily; who bound the Company, by an article in the lease, to make a spirited trial at Paris Mountain. The work for some time bore such an unpromising aspect, that the agent received positive orders to desist, and discharge the miners. Contrary to his masters' injunctions, as the farewell attempt, he collected his whole mining force to one favourite spot; there he sunk, and there within seven feet of the surface he discovered the body of ore, which has ever since been worked with such unparalleled success. The day of the fortunate discovery was the 2d of March, 1768; and St. Chad has ever since

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labours to ascertain the existence of a non-entity; namely, the coinage of Llywelyn the First, Prince of Wales; who is said in the letter to be the owner of the mines at Trysclwyn. Robert *Paris*, the younger, is named as a commissioner, in an inquisition, in the 8th of Hen. IV. to fine the Anglesey insurgents in the cause of *Glyndwr*. This Robert *Paris*, probably, gave Trysclwyn its present name.

been esteemed the patron of the Anglesey miners, who regularly solemnize the anniversary.

From 1768 to 1798, the work evinced a progressive increase; it then betrayed strong symptoms of decline. Men were employed in collecting ore from the refuse of former days; which is evident from a comparative view of the earnings of the miners at different periods. Upon an average of five years, when the work gave the highest profit, the miners earned, by raising ore by the ton, from 5*s*. to 15*s*. each, per day; and some of the most frugal of them now live in the character of gentlemen; if living and faring sumptuously on their interest of money, without labour, entitle them to that appellation. When at length they condescended to raise ore poorer in metal, the earning of each miner, on an average of five years, sunk to 1*s*. 10*d*. per day: but at present, whatever their task-work amounts to, however unproductive the ore may turn out, each miner, by contract, receives 8*s*. a week, certain wages. This was meant as an inducement for men to engage in the mines. The proprietors behave honourably to their miners in other respects. The sick and maimed have a physician and a surgeon to attend them; besides a handsome allowance, out of the Company's fund, as long as they are incapable of work; which must greatly reduce the poor-rates. And they have lately, at their own expense, built a very elegant church for them in the town of Amlwch*.

A great part of Paris Mountain seems once to have been an entire mass of ore. Here are but few shafts and levels, tracing small veins, as in common mines; but vast excavations, some of them about 300 feet deep, and several yards square: in the midway of which, men hung on slings, suspended from elastic scaffolds, pick at the ore, and whistle away many a perilous hour. To these, Shakspeare's description of the samphire gatherer on Dover Cliffs, may very aptly be applied.

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* This account of Paris Mountain mines was drawn up ten years ago. The work has, ever since, gradually declined. 1809.

The strata, bounding the ore, dip in general towards the north, making an angle of about 45 degrees: and some dip transversely towards the west. The matrix of the ore is a petro-silex of a dark colour; over which lie layers of aluminous schistus, and a yellow earth containing ore of lead. In many places, a thin stratum of red shale and ochre lies upon the ore. Some say this redness is owing to mercury, others to arsenic; but iron, more probably, is the principal dye.

As the greater part of the ore is the sulphate of copper, the roasting of it for the sake of the sulphur, is here a principal branch of manufacture. After the ore is quarried out of the mine in ponderous masses, and broken into pieces of a proper size, it is conveyed into oblong covered kilns, from 20 to 50 yards long, from 10 to 20 feet wide, about four feet high; and containing from 100 to 400 cubic yards. Here it is subjected to the action of fire for about six months. In that time, more or less, according to the size of the kiln, the sulphur is separated from the copper; sublimed, and conveyed in fumes through horizontal tubes into a spacious room attached to each kiln; in which it is condensed, cleared out once in about six weeks, and sent to the furnaces by the sea-side; where it is melted, and cleared of all impurities. The sulphur is then cast, some into conical moulds, and some into nine-inch cubes, which are sent off to the several manufactories of gunpowder and vitriolic acid: and some quantity is cast into small rollers, forming what is called the stone-brimstone of the shops.

Besides these kilns which stand on the summit of the hill, others were afterwards erected on an improved plan, close to the sea side. These are conical, with a flue at the top of each, connecting them with the condensing rooms; and are constructed in such a manner as to keep up a constant fire, by having avenues at the bottom, like perpetual lime-kilns, to draw out the roasted ore.

Previous to the year 1784, all the ore was calcined on the top of the hill, in open kilns: and the sulphureous fumes escaping, mixing with the atmosphere, and, by condensation, falling on the soil, spread universal sterility over several hundreds of acres of the lands adjoining; especially those between the hill and the sea. This circumstance corroborates the common observation, that the wind blows the greater part of the year from the quarters of the west, and south-west. At present, since sulphur has been applied to better purposes than to destroy the herbage of the country, the falling dews being not so hostile to vegetation, the proprietors have, since the above period, been enabled, by good management, to restore fertility to a great part of the once entirely denudated soil. Many acres of it are now well fenced, and bear good crops of hay, oats, barley, and potatoes: and it is to be expected that the improvements in agriculture will yet be considerably extended, in proportion as the profits of the mines decrease.

The regulus of copper, if the concentration of the mineralized metal may be so called, which collects itself, in the action of roasting, into a globule in the centre of the ore, is separated by fraction: the regulus is then sent to the smelting-houses, and the refuse to the vitriolic water-pits. Only the ore poorest in metal, is smelted on the spot, yielding about two per cent. The best, which contains from 25 to 50 per cent., is shipped off to the Company's furnaces at Ravenhead and Stanley, in Lancashire; and some to Swansea and Aberavon, in South Wales; on account of the cheapness of fuel in those places. About 20 vessels, from 100 to 150 tons burthen each, were formerly employed in conveying the ore thither; and in bringing back coal, and culm, to supply the furnaces and kilns at Amlwch. Out of 32 reverberatory furnaces, contained in the two smelting-houses, 16 were lately constantly at work; consuming on an average three tons of fuel each, in four-and-twenty hours. At this rate, had they consumed coal only, the yearly amount of the duty of 5*s*. 6*d*. per chaldron on sea coal, would have been 4282*l*. 13*s*. 4*d*.; out of which the Company were allowed, by a clause in the Act, the annual drawback of 1500*l*. How far this statement of the consumption of fuel may be over or under rated, is an information which the officers of the customs at Beaumaris, upon application, were not pleased to communicate. Mr. Williams, however, stated to the Committee, in 1799, that the consumption of coal in the different works of copper and brass, connected with these mines, amounted for several years to 750 chaldrons per day.

Some years back, the number of men employed in both mines amounted to 1500: they became afterwards reduced to about 1200, exclusive of 90 smelters; but now (1809) the number is much less, not even 600. As to the annual amount of the ore once raised, very various accounts have been given to the public:—

Dr. Watson, now Bishop of Llandaff, in his Chemical Essays, states the quantity of merchantable ore annually raised, at from 6000 to 7000 tons:

Mr. Panton, in the 54th No. of the Annals of Agriculture, at 30,000 tons:

Mr. Aikin, in his Tour of Wales in 1797, at from 5000 to 10,000 tons per quarter in Paris mine; and he thought it probable that Mona mine produced an equal quantity: which makes the total amount to be from 40,000 to 80,000.

Something may be said to reconcile these seeming differences. Dr. Watson wrote his account when the work was in its infancy. Mr. Aikin may have taken the number of tons raised in both mines, for that raised in Paris mine only; by which means he doubled the real amount.

The 16 furnaces, perpetually smelting, were used to be replenished with 12 cwt. of ore, each, every five hours; which made 16,819 tons per year. If it be supposed that the same quantity of ore was sent to the furnaces of Lancashire and Glamorganshire, the annual tonnage would have been 33,638; tallying nearly with the account given by Mr. Panton; who, living near the spot, must have his information from good authority. Mr. Williams, also, in evidence before the Committee of the House of Commons, in 1799, allowed that the Anglesey mines had produced 3000 tons of copper per year; which at the low average of 10 per cent. will give 30,000 tons of ore per year. This agrees with Mr. Panton's statement.

The change of place which obtains between copper and iron in the vitriolic waters of the mine, remains yet to be explained. By the natural decomposition of sulphur, in the bowels of the earth, its acid, being detached,

tached, unites itself with the cupreous part of the ore; and, on meeting with a menstruum, forms solution of vitriol. This is conducted out of the mines, by pumps and other contrivances, into large cisterns, some square, others oblong, and about three-fourths of a yard deep. Into these, the refuse of the ore before spoken of, broken from the concentrated mineral or regulus, is thrown; and left there until the acid solution becomes saturated with copper; from which, by evaporation and crystallization, great quantities of Roman or blue vitriol might be procured: but in preference to that, several tons of decayed iron, brought from Coalbrook-dale and other parts for the purpose, are thrown into the cisterns; and the *supposed* transmutation of iron into copper begins immediately to take place. For, by the laws of elective attraction, as chymists term it, the sulphuric acid having greater affinity with, and stronger attraction to iron than copper, lets go the latter, which is precipitated to the bottom of the cisterns, in form of a ponderous muddy sediment, of a yellowish colour; and attaches itself to the iron, which it dissolves, and retains in solution in the same manner as it did the copper before. One ton of iron will precipitate from its solution 19¼ cwt. of copper mud; which will produce, when smelted, 15½ cwt. of the purest copper, selling at 10*l*. more per ton than that procured from common ore. When the change of place between the metals is completed, the acid menstruum containing the iron is drawn from the cisterns, and received into other pits beneath them, so as to leave the precipitate of copper behind; which is gathered out, dried on the kilns, and exported. The menstruum being thus decanted as it were from the cupreous to the martial pits, the latter were, some years back, leased by the proprietors to

Dr. Parr; who extracted the iron from its solution in the acid, in the form of green vitriol, or copperas: but the value of that article having declined, since the substitution of sulphur for vitriol in the manufacture of vitriolic acid; and owing to the difficulty of procuring the copperas free from verdigris, which is supposed to be injurious in dyeing some tints; he found the expense to exceed the profit of the manufacture; and consequently, he turned all his attention to the making of alum. For that purpose, he collected the aluminous shale of the mines, imported argillaceous earth from Dorsetshire, and from Mynydd y Twr near Holy Head; and laid them in beds to imbibe the vitriolic acid contained in the strainings of the works: and by the successive processes of lixiviation, filtration, evaporation, and crystallization, the salt was formed. But the final success of this manufacturing of alum turned out to be the same as the former one of copperas.

What is at present procured from the sulphate of iron, in the lower pits, is yellow ochre; which is refined, dried, and shipped off for the use of painters.

Copper mines have been, and some are now worked, in different parts of the district.

1. Llandudno mines, to the north of Conway, contain some beautiful specimens of malachite, or mammalated green carbonate of copper.

2. Oxydated carbonate of copper; with some specimens covered with lancet-pointed, amethystine-coloured, crystals; at Derwen dêg, to the south-west of Conway.

3. Sulphate of copper, at Drws y coed near Llanllyfni, and at Llanberis. Mr. Lewis Morris mentions a vein of copper ore, 60 yards in length, and three yards wide, to be seen on the surface of the rocks, west

of Aberglaslyn bridge. It has now been worked some years; though hitherto without great profit.

4. Sulphate of copper at Aberdyfi in Meirionyddshire, the property of Edward Corbet, Esq. of Ynysymaengwyn.

5. Sulphate both of copper and lead at Haved y Llan, near Dinas Emrys, in Snowdon.

6. Sulphate, and some carbonate, of copper, at the Buddugre and Clogiau mines, near Dolgelleu. This ore is valuable, and has been worked with spirit. The rock is a semi-indurated whin, intersected by veins of quartz. These kind of ores, intimately blended as it were in the solid substance of the rock, are much more uncertain to be worked than others which are contained in regular sided *rake* veins.

7. Not far from the last described mine, a singular method of procuring copper has been discovered by Mr. Parry. Seeing heaps of peat-ashes, laid by for years, at the doors of some cottagers, adjoining a turbary, he chided them for not bestowing them upon their grass lands. Their answer was, that they had tried them, but instead of improving their grounds, they had rendered them more sterile. Mr. Parry, being of a mineralogical turn, soon divined the cause; and procuring some of the ashes, by chemical tests, found that they contained copper. He employed men to cut and harvest the peat in the turbary; and constructed kilns for the burning of them, and shipped off several tons of the ashes for Liverpool, which yielded excellent copper. From this it appears evident that the bowels of the surrounding mountains teem with copper ore, however difficult it may be to be discovered; and from which solution of vitriol, by springs or otherwise,

must issue to impregnate the peat in the hollows beneath.

8. A north and south vein of sulphate of copper at Esgair vraith, on the boundary of Montgomeryshire and Cardiganshire. It forms a tangent line to the east and west lead vein of Esgair hir.

9. A green dusty ore, called by the miners *copper malm*, on the Llanymynech lime-rocks. *Query*—whether it be the same as spec. iv. in Kirwan, vol. ii. p. 149; which is said to be mineralized by the muriatic acid. Several tons of this malm have been sent off to the smelters. The ores raised in these rocks, whether sulphates or carbonates of lead, copper, or zinc, are all of a superior quality.

2. *Lead.*

Flintshire, according to Mr. Edward Lhwyd, who wrote his Itinerary in the close of the last century, produced then more lead than all Wales besides; and the observation will probably hold good to this day*. The process of extracting lead from flint has turned out so profitable as to create a baronet, give rise to esquires, and add grandeur to the equipages of noblemen.

It is credibly reported that, from under a surface of about four acres of ground at Halkin, the late Sir George Wynne, of Leeswood, procured 500,000 pounds' worth of lead ore†: and Earl Grosvenor 30,000 pounds' worth

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[*] In the year 1792, when lead ore sold so high as 13*l.* per ton, the exports at Chester of lead ore from the county of Flint, and some little from Denbighshire, amounted to 911 tons of dressed ore, and 5037 tons of sheet and pig lead. Since 1792, both the tonnage and price have, at times, much advanced.

[†] These works are now the property of Earl Grosvenor; and a vein adjoining

worth of calamine, or carbonate of zinc, out of one shaft, at Saith Aelwyd.

Talar goch mine, at Diserth, affords ores rich in lead and zinc; and is the property of the Bishop of St. Asaph for the time being. It was leased in 1699 to a London mining company at 12*s*. per ton, and 40*l*. a year*: of late it was said to yield 2000*l*. annual profit; and to give employment to about 100 miners. The ores of lead are its sulphate and carbonate; of zinc, its carbonate, having some specimens exhibiting hexagonal crystals of calamine.

A great influx of water (supposed to be the subterraneous stream of the Alun, which dives and flows under ground for the space of somewhat less than a mile near the place), for some time prevented the raising of lead ore in the late Mr. Wilkinson's mines at Llyn y pandy, near Mold. This celebrated iron-master, whose enterprising spirit and perseverance in arduous undertakings, ranked him in the first class upon record; loth to give up the profits likely to accrue from such a mine, erected a phalanx of steam engines to eject the troublesome intruder: which nevertheless still remained tenant in possession, and baffled all the efforts of engineering. Mr. Wilkinson, unwilling to quit the field, afterwards brought fresh recruits from Bersham, and erected a sixth steam engine, of greater powers than the other five: but still the result of this last attack is doubtful. If the present proprietors be determined to come off tri-

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adjoining Sir George Wynne's old mine, turned out 130 tons of lead ore per week in 1801: about 1803, report gave this nobleman 73,000*l*. a year from his mines in Halkin. In December 1807, the rains, and sudden thaw, caused the inundation of these and the neighbouring mines; so as to keep, for a season, about 500 miners out of employ.

* Lhwyd's Itinerary.

umphant, in expelling the Alun from its subterraneous domain; their dernier resort should be to reverse the course of the stream near its source, by cutting a level under Moel y Vammau, and turning it headlong into the Vale of Clwyd.

Another proprietor of mines closely adjoining to Mr. Wilkinson's at Llyn y pandy, met with better success. With no other engines than pick-axes, buckets, ropes, windlasses, and wheelbarrows, he for some time, about ten years ago, quarried out from 30 to 50, and sometimes as much as 100 tons per week. The expense of raising the ore was 10*s*. per ton for the first 100 tons in the quarter; 7*s*. 6*d*. per ton for the second 100 tons; and 5*s*. for the third: so that the whole expense of raising, and washing the ore ready for the furnace, amounted to no more than 50*l*. per 100 tons. The price of small ore then was 8*l*. per ton; of round ore 10*l*., average 9*l*. By this statement, the proprietor's clear profit amounted to 850*l*. per 100 tons*. A smelting-house, and a rolling mill, were erected on the spot; from whence the sheet lead was sent to Flint for exportation.

The Minera lead works, near Wrexham, having been worked for ages, were thought nearly exhausted: but lately a fresh vein, five feet broad, was discovered at the depth of 70 yards.

Peace and war are terms synonymous with the advancement and depression of the value of lead ore, as well as of other articles of commerce. In 1780, and other years during the American war, lead ore sunk below 6*l*. per ton. When peace returned it gradually rose, and sold for 13*l*. per ton in the year 1792: in 1802, immediately on the proclamation of peace between Great Britain and the French Republic, the price of lead ore advanced to 16*l*. per ton; and some, rich in silver, sold at Bristol for 24*l*. per ton: and then it again experienced the effect of an obstructed market. In the year 1797, the late Mr. Wilkinson, not being able to dispose of his lead, but at a low price, had in store, within the counties of Flint and Denbigh, in pigs of lead, and ore, to the value of 40,000*l*. Earl Grosvenor used to employ 500 miners, in the time of peace, within the parish of Llanarmon yn Jâl: the number at work in the year 1797, within that district, was about 30. The miners thus discharged must have been reduced to distress at the time, had they not been opportunely employed in fencing the enclosures of wastes on some manors in the neighbourhood of Mold. These, and other mines, have since flourished considerably, excepting temporary interruptions by water.

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* The subterraneous water has since found its way into this mine also; and obstructed the miners so much, that they were not able to raise above one-fourth of the ore they did in the year 1797. The tonnage of ore raised in these two sister mines, in the year 1801, was about 1500: the former mine producing about 300, and the latter about 1200. During the reign of the late proprietors, discord paralyzed every exertion; now heaven-born concord has brought about a confederacy of interests, which prognosticates better success. 1809.

About 70 or 80 years ago, a lead mine, producing the species called *galæna*, or potters' ore, at Llangynog in Montgomeryshire, was worked with great profit. Thirty thousand pounds a year, for thirty years successively, was the amount by report: but Mr. Pennant, perhaps nearer the truth, reckons the clear profits accruing to the then Earl of Powys, the proprietor, from 4000 tons annually sold at the average price of 7*l*. per ton, at 20,000*l*. The direction, or bearing, of the grand vein, in the miners' phraseology, was from the "*eight o'clock sun*"—*i. e.* from E. by S. to W.

by N. The width of it has been variously reported: Mr. Pennant states it at three yards and a half; and Mr. Williams, in his Mineral Kingdom, at upwards of five yards; but there are good reasons to believe, from the report of an old miner, who had worked there for several years, that it was not above two yards and a half. He had frequently seen the tallest of the miners lying across the vein, with their arms extended forwards, without being able to reach from rider to ledger. On pursuing the vein eastward it became quite barren; and, on following its dip towards the west, at the depth of from 90 to 100 yards, the work became inundated, and consequently relinquished. Several years afterwards, some neighbouring miners, paying tonnage to the lord of the manor, prosecuted the work with considerable profit: but their adventures went no further than collecting fragments of ore, neglected as beneath the notice of the former miners, and pursuing the ramifications of the great vein.

Of late, a new company has leased these mines, and driven a level beneath, at great expense, in order to expel the water. The miners, in their progress, have met with blocks of pure ore from 70 to 100 lbs. weight each.

Mr. Williams, in his Mineral Kingdom, published in the year 1789, gives no great encouragement for the further prosecution of this mine. His words are (vol. i. p. 274)—" Llangynog was perhaps the richest vein of lead ore, for the time it lasted, of any yet discovered in this island. They had five yards of clean ore in the middle of the vein, so pure as to be loaded from the kebbles into the waggons for the smelters; besides several feet wide of ore upon the sides of the vein, mixed with spar, &c., which required dressing.

"This rich vein was at once cut out below by a bed of schistus or shiver; and that so entirely, that there was not the least fissure or vestige of the vein remaining; nor ever could be found afterwards, though diligent search was made by the most skilful miners for several years, and at several times. The vein at Llangynog was a gash vein, which ought to be distinguished from the slip vein. When a dyke or a twitch obstructs the progress of the latter vein, an experienced miner knows where to find it again, either to the right hand or the left, above or below; but it never opened, nor no trace of the vein could ever be found at Llangynog, though diligently sought at great expense. And no wonder they did not find it, when in fact it was not to be found. The gash which divided the harder rock above, did not enter into the bed of shiver below; and consequently there was no vein or fissure in that place."

The Flintshire lead ores are imbedded either in limestone or chert; but this vein at Llangynog runs through a coarse argillaceous schistus, or grey stratified mountain rock, in a matrix of amorphous quartz. The sketch (*Plate* I. *Fig*. 1) may give some idea of the position of this grand vein, in respect to its several diagonal ramifications; distinguishing the barren veins from the productive.

Plate I. *Fig*. 4, A A, simple limestone strata.

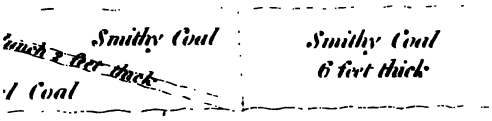
BB, a bed of limestone, forming the segment of a circle; breaking, but not disarranging, the other strata; and also containing lead ore.

CC, a thick bed of common limestone, containing nodules of another species imbedded in it.

DD, a calcareous bed, called flummery stone; as fine grained as chert; being the only species containing calamine.

Lead

Fig: 3


Smithy Coal
Smithy Coal
6 feet thick
uch 2 feet thick
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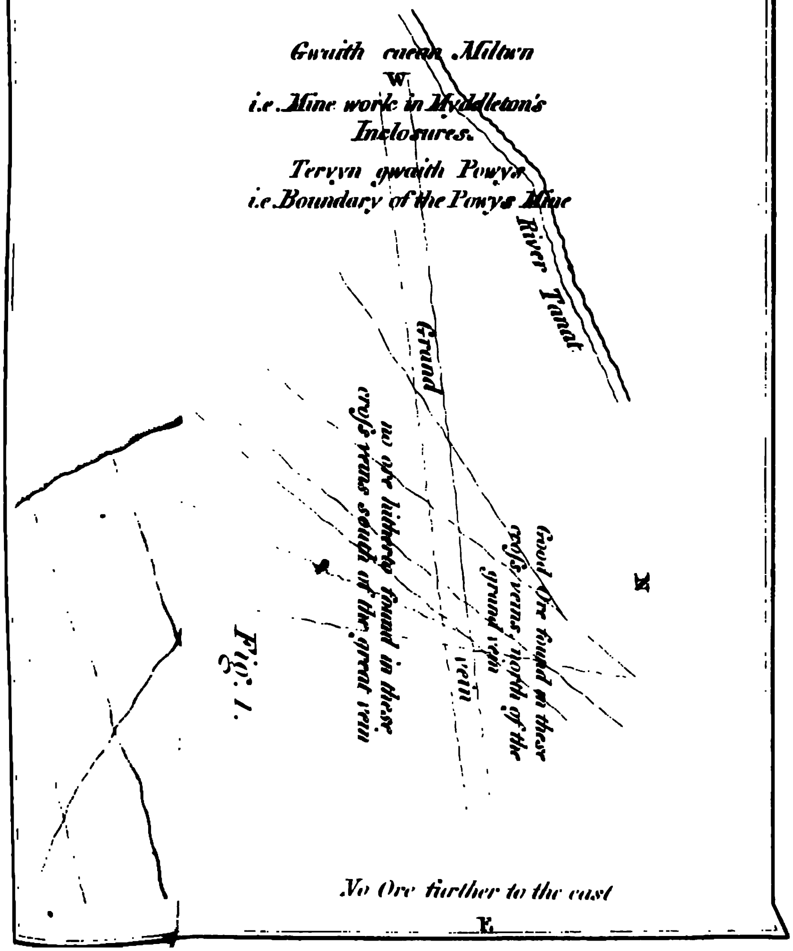
Gwaith ucha Milton
W
i.e. Mine work in Myddleton's Inclosures.
Terfyn gwaith Powys
i.e. Boundary of the Powys Mine
River Tanat
Grand
no ore hitherto found in these croſs veins south of the great vein
Good Ore found in these croſs veins north of the grand vein
vein
N
No Ore further to the east
E

Fig: 1.

Lead ore has been discovered, in various quantities, in many other parts of the district.

In Montgomeryshire.

1. At Craig y mwyn, near Pistyll Rhaiadr; an ancient work of great note, and probably not yet exhausted.

2. At Dylivau, to the west of Llanbrynmair; a considerable mine.

3. At Esgair hir, on the borders of Cardiganshire, adjoining the copper mine called Esgair vraith; a candidate, with the mines of that county, for being the mine called the "Welsh Potosi," by former topographers.

4. On the Berth-lwyd estate, &c. near Llanidloes—recent trials.

In Meirionyddshire.

1. At Moel Isbri, in the parish of Llanelltyd.

2. Near Pont yr avon ddu; adjoining the copper mine No. 6.

3. At Bwlch y plwm, near Traeth mawr.

4. At Graig wen, near Dinas Mowddwy. This vein seems to have been above two yards wide; and appearing upon the surface of the rock, in a north and south direction. It was worked by the lord of the manor; and gave considerable profit, while it lasted; but not possessing the true adventurous spirit of a miner, he would not attempt to search for ore out of the light of day. A company, of late years, drove a level, from east to west, across the exhausted surface vein; but finding the blasting of the indurated rock a very expensive process, they soon desisted. The strata of the rock run parallel with the vein of ore; and are, at

regular distances, intersected by veins of quartz. This makes it suspicious that the ore was not in a continuous *rake* vein, but simply a collection of *shode* ore.

5. At Melin llyn y pair, in the parish of Tywyn, on the property of Mr. Corbet.

6. At Bryn-dinas, near Dyffryn gwyn, adjoining No. 5.

In Caernarvonshire.

1. At Penrhyn du, adjoining the St. Tudwal Islands.

2. At Bwlch haiarn, near Gwydir, on the road from Llanrwst to Capel Curig. The east and west veins are crossed by others from north to south.

3. At Capel Curig. Calamine is also raised here, as well as at No. 2.

4. At Gest, near Penmorva.

The lead of most of our mines is mineralized by sulphur; forming the lamellated kind called potters' ore, or *galæna*, and the steel-grained ore. Some few exceptions exist, such as the dusty ore, and the vitriolated, at Paris Mountain; the carbonate of lead, at Talar goch; the green ore, and brown caulk, at Halkin: but these latter kinds are better suited to amuse the speculative mineralogist than to enrich the practical miner.

The most general direction of the veins is from east to west; and those which take the transverse point, from north to south, are, within this district, upon an average, poorer in ore; and that ore less frequently yielding silver: though the reverse of this is asserted by Williams (Min. King. vol. ii. pp. 320, 324). He, probably, founded his theory upon the general character and produce of the Scottish mines; but he owns exceptions to the general rule, and the mines of this district form a strong exception. Both these kinds of veins frequently vary a few degrees from the cardinal points, but seldom materially. They sometimes cross each other at right angles; and, not uncommonly, as the case is in the animal world,—the stronger vein throws the weaker into confusion.

The common produce of galæna ore, is from 12 to 16 cwt. of lead, and from 10 to 16 ounces of silver, per ton.

There is a north and south vein, running through the parishes of Mold and Kilken, if not through the whole of the county of Flint; consisting chiefly of spar, which by its appearance, in some places, seems to be the fluor. It breaks every vein it crosses in its course, without being itself interrupted, or deranged, by any: for which reason the miners have, in their own peculiar idiom, given it the appellation of *gallop-hell* vein.

Iron.

We have no iron ores, in any quantity, excepting the accompaniments of the coal ranges. Great quantities of these have been used at Brynbo near Wrexham, in union with the more fusible and glossy ore from Cumberland. If the reddish glossy ore lately discovered near Penbedw, within a few miles of Mold, will answer expectation, it will save the trouble and expense of importing any more from the North.

Semi-Metals.

The carbonate of zinc, called calamine, is copiously raised in several parts of Flintshire; at Moelydd, and Llanymynech, near Oswestry; and at Bwlch haiarn and Capel Curig in Caernarvonshire. From the two latter places it is shipped off at Trevriw, for the Bristol founderies; and from the former, besides what is used in the Holywell brass manufactories, it is sent by the inland canals to Cheadle, and Macclesfield. It sold in the year 1792 for six guineas per ton; in 1798, from five guineas to 5*l*. 10*s*.; and in 1802, for 10*l*.

Calamine is found in various species of rock; in slate, trap, chert, but more generally in limestone; and of limestones, it is peculiar to that kind called flummery stone. See *Plate* 1. *Fig*. 4, which refers particularly to Coed Trevlech, Soughton, and Moelydd lime-rocks, near Oswestry.

The other ore of zinc, called its sulphate, blend, and black jack, may be plentifully raised in many places: but it is now almost entirely neglected; its present price being so low as 4*l*. 10*s*. per ton, delivered at Bristol. It may therefore, by degrees, be restored to its former use of being a material in the repairing of roads. Calamine is always preferred to black jack in the manufacture of malleable brass; the latter is never used but for ingots, bell-metal, and to be reduced to speltre or regulus of zinc.

Having said thus much of metals and semi-metals, we proceed to fossils.

I. *Calcareous Substances, united with Carbonic Acid.*

1. *Limestone.*—The limestone range commences, on the south of the district, in an abrupt precipice about 900 feet high, at Llanymynech. From thence, in a northern direction, it forms the limit of the Salopian plain; and, taking in its course Porth y waun, Coed Trevlech, Soughton, Cyrn y bwch, Brynygarth, and

Vron lime-kilns, arrives at the river Dee. Here it expands, makes an angle in turning towards the north-west, and seems to take in its course almost the whole of the county of Flint, and a great part of Denbighshire. The southern line of the range appears immediately on the other side of the Dee, at Trevor; goes on to the bold rocks of Eglwyseg, near Valle crucis Abbey; then to the heights of Jâl; and, crossing the upper extremity of the Vale of Clwyd, from Llanelidan it proceeds as the south-western parapet of that vale to Venechdid, Coed Marchan, Denbigh, Cevn Meiriadog, Llanddulas, and terminates in cliffs overhanging the sea at Llandudno or Orme's Head. The northern line, having passed the collieries and freestone quarries at Ruabon, appears at Minera; runs parallel with the southern branch, from Llanarmon to Llanverres; thence through the western part of Mold parish, the centre and east of Kilken, all Halkin, the west of Holywell, the centre and east of Eskeiviog, almost all Caerwys, east of Dinmeirchion and Cwm, west of Whitford and Llanasaph, all Newmarket, Gwaunysgar, and Meliden, to Diserth; where it terminates in a bold promontory facing the sea north-west.

This limestone tract, after having dipped as it were under the Bay of Beaumaris, appears again on the opposite shores of Anglesey; proceeding, in the same north-western direction, along the sea coast from Penmon to Dulas; and thence beyond Amlwch to Cemmaes, and the northern parts of the island. In some places, veins branch out, in a transverse direction, into the interior of the island; as from Llugwy to Llanffinnan and Llangefni; and from Penmon it appears upon the Menai, at Plas Newydd, Llanidan, and Trevarthin. From the latter place, a line of insulated lime-rocks appears, still in the same parallel direction, at Trevdraeth, Bodwrog, and Llanfaethle. Between these two lines are millstone, and other inferior gritstone quarries; and between the southern line and Caernarvon Bay, a finer kind of freestone is found; of which Mr. Meyrick built his elegant seat at Bodorgan. If these lime and freestone strata have any degree of regularity in their inclination as well as their bearing; some particular spots may be pointed out by an experienced naturalist to sink for coal, with greater success than has hitherto been done, in Anglesey, where fuel is so extremely scarce.

The limestone range here traced from Llanymynech on the confines of Shropshire to Anglesey, forms the boundary of North Wales, both on the east and the north. All the interior tract, included between this range and South Wales, consisting of Montgomeryshire, Meirionyddshire, the greater part of Caernarvonshire, and Denbighshire, is almost entirely destitute of lime. Meirionyddshire has one small insulated white lime-rock at Gwerclas, near Corwen; in which about 50,000 bushels of lime are annually burnt with coal, carried from Ruabon, the distance of 20 miles.

Besides the limestone here treated of, which is of an excellent quality, and very white on its efflorescence after calcination; a line of dark coloured argillaceous limestone may be traced from Denbighshire in a south-western direction across the whole of the county of Meirionydd. The north-eastern extremity of the line, as far as it has been discovered, commences at Cadair Ddinmael, near Cerrig Druidion; where lime was burnt in the seventeenth century [*]. Then it may be observed on the right-hand side of the road leading to Holy Head, at that tremendous and romantic dingle called Glyndiphwys; afterwards at Llwyn y ci near Rhiwlas; and crossing the river Trywerin to Llanuwchlyn, it is again found at Llanfachreth, Braich y bedw, Blaenau, Hengwrt ucha, Caer Ynwch; and last of all at Bwlch coch, near Cadair Idris. Other places where this grey limestone is found, in a line nearly parallel with the former, are Rhiwaedog, and on the other side of the Berwyn at Rhiwarth, at Bryn melyn, Cwm Hyfed, Bwlch y Groes, and Cwm Tylyddiau, near Llanymowddwy.

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[*] Lhwyd's Itinerary.

The great proportion of argillaceous earth in the composition of this stone, makes it much inferior to white lime, both as a cement and manure: but on account of its being universally burnt with peat, the ashes of which, in great quantities, becoming mixed with the lime, it must make an excellent top-dressing on grass lands.

Montgomeryshire also has a small portion of such argillaceous limestone. The direction of the vein is, nearly parallel with those in Meirionyddshire, from north-east to south-west. It commences at Porthywaun lime-rocks, and terminates in Powys Castle park: but coal being so distant, and no peat in the country, it cannot be of much service; more especially since the opening of the canal.

Terras limestone is imported into the district from Aber Daw in South Wales; which is quite unnecessary, unless it be brought as ballast; for several veins of it are found in Flintshire, in the parishes of Holywell, Nannerch, and Yskeiviog, &c. Lord Uxbridge, in his late improvement of Plas Newydd in Anglesey, imported terras limestone from South Wales; although great quantities of it lay in the lawn, close by his house.

2. *Marble.*—White marble at Langwyfan in Anglesey, bearing a good polish.

Blue-veined grey marble, and white ditto, at Cemmaes, near Amlwch.

"In the year 1747, a plank of grey marble had been thrown out of its bed by the sea, and found in Redwharf Bay in Anglesey; measuring 27 feet long, nine broad, and three thick, =629 cubic feet: its specific gravity being 2.7, it must weigh above 47 tons. Such planks sawed, would have made fine columns for public buildings: how could they have escaped the eyes of the proud Romans*?"

A marble mason at Beaumaris advertises his Mona marble; and prides himself in having sent a chimney-piece made thereof to Her Majesty, as a present from a peer.

Dark coloured marble near Diserth Church in Flintshire; and at Cyrn y bwch, near Oswestry: of the latter, beautifully bespangled with white, chimney-pieces have been made.

Other variations of the carbonate of lime are; regular formed spars; stalactites; and coarse mineral agaric, at Ffordden near Caerwys, and at Trevor near Llangollen; no use being made of it, except by the peasants to polish their pewter utensils. Pigeons, however, seem to have a different idea of its qualities, as they crowd to it in great numbers.

Marl seems to be dissolved lime, washed down into the plains, from the limestone ridges, by some violent torrents: it is not found any where in this district, save in situations naturally favourable for the reception of such depositions.

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* Mr. Lewis Morris, in his Book of Charts.

II. *Calcareous Substances united with Fluoric Acid.*

Fluor spar in abundance, in the Gallop-hell vein in Flintshire.

Amethystine cubic spar on Halkin Mountain.

III. *Barytes, or Ponderous Earth Genus.*

1. Barytes united with vitriolic acid, at Cevn Meiriadog near St. Asaph; at Gallt y main, Llanwyddelan, and Llangynog, in Montgomeryshire; and tinged with red, at Llangeinwen in Anglesey.

2. Barytes united with carbonic acid, the *terra ponderosa aërata*, at Pennant, between St. Asaph and Holywell; where it is the matrix of the sulphate both of zinc and lead.

IV. *Siliceous Genus.*

1. *Flint.*—Some few fragments near Bala Lake, and on the sea shores.

2. *Quartz.*—The farmers in the upland districts find this substance too abundant in their fields, much impeding the progress of agriculture; being frequently in nodules of from 10 to twenty tons weight. In mineral veins, it is the most common matrix of lead and copper ores. Several veins consist entirely of quartz, on the surface. On the *Glip* rock near Harlech, and at Creginan near Dolgelleu, they are very prominent, and several feet wide.

Messrs. Worthington and Co. from Liverpool, leased a quarry of quartz of the late Rev. Mr. Griffith of Caer Rhun, at *5l.* a year, and *14d.* per ton, with allowance for damages: and if ore were discovered, it was to be worked by the lessees, the lessor to have one-eighth share.

Quartz and chert from the Caernarvonshire quarries, with flint imported from Kent, &c. are ground at a mill erected by the late Lord Penrhyn, and sent to the English potteries.

3. *Chert.*—The hills on the north-eastern coast of Caernarvonshire have a great part of their composition of chert. What is free from iron, and fit for the potter's use, is brought to the mill near Llandegai. Chert is also found in many parts of Flintshire, between the limestone and coal; at Trevarclawdd near Oswestry, and on the Llechrydau Hills near Glyn Ceiriog. Several high hills, whose surfaces at their bases are composed of argillaceous schistus, have their middle parts covered with blocks of chert, and their summits with masses of the granitinc species.

4. *Burr*,—Or the substance of which French millstones are made, was lately discovered, in the Moelgolfa Hills near Welsh Pool, by Mr. Field Evans; for which he received a premium from the Society for the Encouragement of Arts. Another vein of burr was opened, much about the same time, near Conway; and the same Society, most laudably, gave a premium of *100l.* to the widow and orphan children of the discoverer, in the year 1800. Both these quarries lie convenient for water carriage: but the most unsatisfactory part of intelligence is, that the demand for our Cambrian burr does not answer expectation. With an un-

willingness to be inferior to the French in any point, the siliceous rocks of Scotland and Wales, which are various and extensive, should be minutely examined; in order to discover, if practicable, burrs not inferior to those of the Continent.

The Conway vein runs in an east and west direction, along the hill called Mynydd y drev. In some places, the vein is regularly sided by chert; in others, not. It is of various breadths, from 10 to 20 yards; and of depth unknown. The chert, on the north side of the vein, partakes of the nature of burr for some yards; and then recovers gradually its own characteristics. The south side of the vein is of an inferior quality, more brittle, and containing larger nodules, of an irony tinge, which seem to have been formed by ebullition, as if the whole mass had been liquidated by intense heat. The gritty chert on the south side of the vein, recovers its smoothness by degrees; and, a little to the west of the quarry, appears in very regular strata, inclining considerably to the north: whereas the burr, in the quarry, inclines but very little. The best burr is not that with the most entire surface, nor that which is full of holes; but a medium between both extremes. The too even surface heats too much in grinding. The millstones sell, according to size and thickness, from two guineas to four guineas per cubic foot; amounting to from 30*l.* to 40*l.* a pair.

V. *Argillaceous Genus.*

1. *Clay.*—On the banks of the Dee, between Overton and Bangor, are quantities of ductile clays, that will bear calcination. In most other parts, the quantity together is either too small, or too much impregnated with iron, to merit the attention of the potter.

2. *Argillaceous Schistus.*—Some account has been already given of the two ranges of slate hills, in the Section upon Soil and Surface: and somewhat more shall be added in the Section upon Manufactures.

VI. *Magnesian Genus.*

1. An earth near Amlwch in Anglesey, yielding two-thirds of pure magnesia.

2. *Steatite,*—Or soap rock, in different parts; especially at Craig y Sebon; on the hill north of Penmorva; at Llanvair Ynghornwy, and at Mynydd y Twr, in Anglesey.

3. *Serpentine,*—In Breddin Hill, in Snowdon about Capel Curig, at Cenimaes and Maes y Porth in Anglesey.

4. *Fuller's Earth,*—Both white and dusky, in small quantities, at Mynydd y Twr near Holy Head; and a saponaceous argil, which may probably be the pozzolana earth enquired after in the 83d No. of the Annals of Agriculture; but it possesses none of the properties of that extraordinary cement.

5. *Asbestos and Amianthus,*—At Llanvair Ynghornwy in Anglesey; and unripe asbestos, of a waved schistose appearance, in several parts of the island; especially on the coasts of the Menai, from Bangor Ferry to Maes y Porth, opposite Caernarvon.

VII. *Inflammable Substances.*

1. Native sulphur at Paris Mountain.
2. Varieties of pit-coal. *See Section on Fuel.*

SECT. VI.—WATER.

This corner of the kingdom is, in general, highly favoured with abundance of water for the various uses, conveniences, and comforts of life. The inland springs are very numerous; and afford water pure and salubrious as the vehicle of aliment. These springs, uniting in rivulets, sometimes fall in beautiful cascades; at others, rush down in furious cataracts; and from thence do loudly call on the manufacturer as well as the farmer, to enlist every Naiad in the service of trade and agriculture. The coalition of these streams forms rivers capable of infinitely more extended commerce: some holding their domains of the ocean *in capite*; others paying their tributes to his lieutenants, the Severn, Dee, Conway, and Dovey. These, with an extent of sea coast of about 200 miles, from the mouth of the Dovey to the estuary of the Dee (exclusive of the Menai), must certainly be able to supply the district with one cheap article of provision, were indolence banished, and the abuses of fisheries corrected.

There are no rain-gauges, or meteorological diaries kept, *pro bono publico*, within the district. By the heights of its mountains, and by its western exposure to the vapours of the Atlantic, the quantity of rain falling at Llanrwst, Dolgelleu, or other places of similar situation, must be considerable; amounting probably, on an average of some years, to 50 inches. However, in a dry summer in the last century, it is reported that "there was more milk than water within the parish of Gwaunysgar in Flintshire; although a neighbouring hill, Mynydd y Cwm, is said to abound with seven score and seven springs*."

In comparison with Scotland, or Ireland, our lakes are but few and small. The largest is Llyn Tegid, or Bala Mere, in Meirionyddshire; being nearly 12 miles in circumference, and fathomed in different places to the various depths of 55, 70, 100, and 120 yards. Twenty-six lakes are said to be within view of the Peak of Snowdon.

We have no *thermæ* or tepid springs, neither are our mineral waters numerous. There are two springs strongly impregnated with hepatic air†; and a third, whose water is extremely limpid, and more ponderous than common spring water, within the parish of Meivod in Montgomeryshire. The latter has been found efficacious in curing the scrophula and other obstinate ulcers. Some of the faculty smile at the simplicity of the afflicted who make trials of its healing virtues; but their patients have the greatest cause to smile, since by the use of it, they get rid of their complaints without getting rid of their money. Whether the water contains any mineral in solution, remains yet to be discovered. Prussian lixivium takes no effect: but, notwithstanding, it may be impregnated with a neutral salt, having an earthy, or an alkaline, basis.

Chalybeate springs are too frequent to be enumerated:

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[*] Lhwyd's Itinerary.

[†] There is a sulphureous spring of this description near New Town in Montgomeryshire. Adjoining the river Alun, near Caer Gwrle, in Flintshire, are two saline springs. Dr. Short gives an instance of a patient, in a deplorable scorbutic case, who was perfectly cured by the use of these springs. The water is a strong cathartic.—*Pennant*, i. 407. Irish edition.

many of them deposit an ochery sediment, in such quantity, as probably to be worth the notice of chemical druggists, &c.

St. Winifred's Well, in Flintshire, seems to be one of the most copious springs in nature. According to an accurate experiment, it emits water at the rate of 120 tons in a minute; and the strong ebullition necessary to perform such a discharge, accounts for pebbles, of an ounce weight each, being continually suspended, or rather supported, aloft in the stream. The distance, from the source of the fountain to the marsh where it enters the estuary of the Dee, is no more than one mile and 284 yards; in which short space it is the potent agent of motion to eleven mills of complex machinery; one for grinding corn, four for the manufacture of cotton, and six for that of brass and copper.

CHAP. II.

STATE OF PROPERTY.

SECT. I.—ESTATES, AND THEIR MANAGEMENT.

IF by estates be here meant, the annual income of persons in landed property; and if the disclosure be not too great an interference with the private concerns of individuals; such incomes may be pronounced to be here, as they are in most other places, of various sums, from *thirty* shillings to *thirty thousand* pounds.

The effect of the custom of gavel-kind, which obtained all over Wales, was a too minute division of property. Equality and poverty went hand in hand. But when the custom was abolished, and alienation permitted, an accumulation of lands was the necessary consequence, which became very prevalent in the two last centuries; and having arrived at its maximum early in the eighteenth century, it has, since that period, shown some instances of retrogradation: but subdivision and accumulation of estates will naturally fluctuate.

Here are no petty lairds or tacksmen, as in Scotland and Ireland. Gentlemen of moderate income, and residing in the country, transact the affairs of their own estates. Those of greater property commit the whole care of rents, repairs, and contracts of sale or purchase, to the management of agents; who, in general, are persons well qualified for the undertaking, brought up solely to the business, and make it a point of honour and integrity to do justice to the landlord, and a point of conscience not to oppress the tenant. Happy are both parties connected with such mediators. Such estates may easily be distinguished from others, by the surface of the soil, buildings, fences, &c.; and the tenants themselves, in general, have as it were imbibed the economical management of those who superintend them. Powys Castle estate managed by Mr. Probert, Gregynog estate by Mr. Colley, and Penrhyn estate by Mr. Wyatt, are instances, among others, verifying the observation.

Some Reporters, and other writers on agriculture, lament that too many estates are under the management of lawyers, who fill leases, and other contracts, with the quibbles of attorney-craft, to the frequent no small embarrassment of tenants. Some years back there might have been cause for this complaint; but now the times have changed. Some of the lawyers of those days, having by their own indiscretion and rapacity destroyed the very *vis vitæ* of litigation in the people, necessarily diminished the number of their successors; which, by death, taxes, and the prosecution of the example shewn by that potent auxiliary, the late Lord Kenyon, will soon be reduced to the number requisite for the transactions of affairs of credit*. Upon the whole, tenants, in general, have no cause to regret being under the superintendance of those professional men; and such of them as manage lands themselves, are, in general, to be classed with the first-rate farmers, manifesting to the world that they have the command of the plough as well as of the quill.

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* In the year 1801, there was but *one* articled clerk within the county of Montgomery.

SECT. II.—TENURES.

ONLY two copyhold tenements have been noticed in the whole district. All the other estates are held either mediately or immediately *in capite* of the King, by a kind of mixed tenure between the feudal and allodial, going under the common appellation of freehold: if the former, as in the *marches* of Wales, the chiefty* is paid to the lord of the manor, and personal attendance, twice in the year, is also required at his courts; if the latter, as in the interior and in the western extremities of the district, a small chiefty† is annually payable into the Auditor's Office.

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* Called *rhent arglwydd.*

† Called *ardreth y brenhin.*

CHAP. III.

BUILDINGS.

SECT. I.—HOUSES OF PROPRIETORS.

THE seats of the nobility and gentry exhibit some fine specimens of military and civil architecture. Among the former are, Powys Castle in Montgomeryshire, Penrhyn Castle in Caernarvonshire, and Chirk Castle in Denbighshire.

Powys Castle is a paragon in the Gothic style, built of red calcareous freestone, quarried out of the adjoining park; and from its colour it is called by the Welsh *y Castell Coch.* The gardens were laid out and ornamented, under the direction of De Valle, by the Duke, of James the Second's creation, in the whimsical style of the French King's gardens at St. Germains*.

Chirk Castle was built by Roger Mortimer, in the thirteenth century, on the improved plan of castle-building brought from Asia into England by Edward I. "This exalted pile," says Mr. Pennant, "has much to boast of in its vast view into 17 counties; a most elegant and varied extent."

In civil architecture, there are edifices displaying varieties of orders, from the gaudy Composite to the plain Tuscan; many Gothic, and some of the nondescript class.

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* Lord Lyttelton.

Such houses as are adjacent to the coal range, from Wynnstay on the east, to Bodorgan in Anglesey on the west, have had the conveniency of being built with that useful concomitant of coal, *freestone*. Wynnstay and Bodorgan consist of freestone, raised within a few hundred yards of their respective scites. In some places, limestone yields to the mason's chisel, and is accordingly honoured with the appellation of marble. Of this material, of a dark grey colour, Plas Newydd in Anglesey, the elegant summer residence of the Earl of Uxbridge, has lately been rebuilt. In the interior, houses are built of blasted stone, and schistus: such is Nannau in Meirionyddshire, lately built, the seat of Sir Rob. W. Vaughan, Bart. Member for the county. Some blocks of the schistus bear a regular square, and weigh about three tons each. In those parts of Montgomeryshire where the hills consist mostly of shale, houses were formerly built of massy timber; and now, most commonly, of brick.

SECT. II.—FARM-HOUSES, OFFICES, AND REPAIRS.

In the counties of Anglesey and Caernarvon, instances of well contrived farm-yards may be seen at Trev-Jorwerth, at Caer Rhun, at Pentir, and several other places. The thrashing-floor, with a spacious bay on each side, front the entrance into the yard; behind them lies the stack-yard; the two wings contain sheds for cattle, and stables. The sheds are very airy, having rail-gates instead of close doors. Between the cattle and the fodder-binn is an alley for the feeder to walk in, from one end of the shed to the other. The receptacle for the dung is a puddled cavity in the centre of the yard, where absorbent mould is first thrown to imbibe the superfluous moisture. The urine is conveyed in covered pipes to a common reservoir; and from thence, by a forcing pump, into the dung-heap, when it is turned over. In addition to the above conveniences, the Rev. Mr. Ellis, Rector of Llanystymdwy, contrived a method of watering cattle in their stalls, by means of pipes conveying water from a pump into covered cisterns, which the feeder opens, from his alley, by cords fastened to the staples of the lids; which, when the cattle have been supplied, he lets down again, and they serve for bottoms to the troughs wherein turnips are given them. The hay is put into a semi-cylindrical rack, placed in the middle of each stall; from which two beasts feed.

Some of these farm-yards have been constructed at the expense of 1000*l.*; but wherever rearing and feeding of cattle are objects of farming; and wherever dung, savingly collected, and well fermented, is an object of manure; such conveniences can scarcely be bought too dear.

In Meirionyddshire, the farm-yards of Sir Robert W. Vaughan at Nannau, of Mr. Oakeley at Tan y bwlch, and of Mr. Corbet at Ynysymaengwyn, are well contrived, for soiling, and accumulating manure.

In the other three counties, of Denbigh, Flint, and Montgomery, farm-yards upon improved plans are too numerous to be particularized: however, about seven in every ten are still in a most wretched state; and many proprietors who have lately built, seem to have had too great a predilection for the old scites.

Some very compact and economical farm-houses and yards, adapted to the size of the farms, may be seen on the late enclosure on Saltney Marsh in Flintshire.

In respect to repairs, there is no general system adopted. The contracts and methods being so various, render them too tedious to be reported.

SECT. III.—COTTAGES.

A GREAT part of the counties of Anglesey, Caernarvon, Meirionydd, and Montgomery, is disgraced with a species of cottages, which are truly the habitations of wretchedness. One smoky hearth, for it should not be styled a kitchen; and one damp litter-cell, for it cannot be called a bed-room, are frequently all the space allotted to a labourer, his wife, and four or five children. The consequences are obvious; filth, disease, and, frequently, premature death: and they would be more obvious, had not these evils an almost unsubduable vigour of constitution to encounter. Three-fourths of the victims of the putrid fever, perish in the mephitic air of these dwellings. However, in some parts, especially near lime-works, mines, collieries, &c. the example of one neat cottager is followed by others. Here, their dwellings are frequently white-washed; their children are industrious in collecting road manure, which is preserved within circles of loose stones, for the use of their gardens. These minutiæ, though trifling, are worthy of record, as they are descriptive of their general character.

Three sets of cottages may here be described, as a striking contrast to those of the first description.

In the Vale of Clwyd are several neat brick-built cottages. Some of them the property of Mr. Wilding of Llanrhaiadr, and others of Mr. Edwards of Cerrig llwydion. The latter, some years back, erected thirteen cottages, all within a mile of his residence. They have upper stories for bed-rooms; and a skilling at each end, one for a cow-house, the other for a milk-room. They are slated, white-washed, and many of them ornamented with sham windows and balustrades.

One cottage has six acres of land annexed to it; which maintains two cows, a calf, and a pig; besides some in tillage: rent 9*l.* 5*s.*

A second with four acres, maintaining two cows and a poney: rent 8*l.* These were the rents in 1799.

A third with two acres, keeping one cow and one poney *.

This information was procured from one of the cottagers, who, in the dusk of the evening, having retired from his labour, was literally *sitting under his vine;* for the wall was covered with grapes. A smile of complacency sat upon his countenance; and the heart of the Writer of this Report also, being as it were in unison with his, felt an agreeable sympathetic sensation: of all the excellencies which this vale, the Cambrian Paradise, can boast of, the comfort and contentment which these cottagers appeared to enjoy, gave him the greatest delight.

The late Arthur Blayney, Esq. of Gregynog in Montgomeryshire, a character intended to be mentioned with distinguished praise, in the *Section on Improvements*, finding that *industrious* labourers were scarce, because they were yearly migrating into towns, and other places more attractive than the country which denied them even the farming of an acre of land; resolved to render them more attached to his neighbourhood, by building for them, not only convenient but elegant houses and offices, and annexing land to each sufficient for the keeping of a cow, some two, and some even more, at very easy rents. He thereby succeeded in his wishes; had a set of constant labourers, firmly rivetted to the service of their patron, and devoted to the common cause of their King and country.

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* A cottager's stock should be, a milch cow, a calf in rearing, and a pig: ponies might easily be dispensed with.

When the late Lord Penrhyn became possessed of his Caernarvonshire estate, the number of workmen employed in the slate quarries at Dolawen, did not exceed 60; but by his Lordship's assiduity in removing all obstacles, the number at length increased to upwards of 400. To accommodate this surplus of families with habitations, 40 cottages were built on the spot, from the year 1790 to the year 1800; containing 63 dwellings, many of them having double apartments. In the year 1795, when those twin-evils, war and taxation, had so reduced the export of slate at Port Penrhyn as to occasion the dismission of many quarrymen, his Lordship, in order to find them employment for a season, set them about enclosing, draining, and otherwise improving, a large tract of very poor turbary soil; which, after a certain rotation of crops, was to be laid down in grass, and lett as a ley to feed the cows of the cottagers.

These cottages and improvements have given variety and life to a most dreary and forlorn waste. The architect, giving full scope to fancy, has studiously varied the plan of each cottage. Plantations are every where judiciously grouped; and sterility, after many thousand

sand years' tenure, has at length been ejected from this romantic spot, by perennial as well as vernal verdure. Ogwen Bank, an elegant cottage, built for the occasional reception of its noble proprietor and his friends, is the chief, not only of the cottages in this alpine hamlet, but of all the cottages in Britain. The majestic heights of Carnedd y Viliast, and Carnedd Llywelyn; the avernian gloom of dismal Nant Ffrancon, at a proper distance, surrounded with precipices super-eminently horrible; and the foaming cascades of the precipitant Ogwen;—all in contrast with the lively and busy scenes on the spot, the effect of the successful industry of man, form one picturesque whole, which may set all the powers of description at defiance.

As advocates to support the worst of causes may be procured, it is not surprising that the writers of some County Reports should be so hostile to the measure of annexing two or three acres of land to cottages, to be rented of the landlord *independently* of the farmer*. With great penetration they observe, that "few men will labour hard any farther than the compulsion of necessity;" as if an acre or two to supply a fellow-creature, and his infant family, with the milk and butter of a cow, would enable him to live without labour. Their observation may be true as far as it relates to a certain description of men; for all labourers certainly are not inclined to be industrious, any more than all farmers are disposed to be humane. Long experience has engraved upon the records of truth, that men renting two or three, or even five, acres, are frequently to be classed among the *most industrious* and

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* It gives, however, some consolation, to find such an able advocate as Mr. Kent on the side of humanity.

constant labourers. They have been known to rear seven or eight healthy and active children, without being at one farthing's expense to the parish; while the dispirited wretches, whom these dictators treat as the outcasts of society, seldom, or never, attempt the rearing of the second or third child without parochial assistance. Deprived of the conveniency of a cow, the labourer or his wife, in some particular situations, will be necessitated to go perhaps four or five miles to market to buy a pound or two of butter; and the farmer, who thinks it impolitic that his labourers should have an acre or two, each, to keep a cow, can hardly be very well disposed to take the milk and whey from his pigs, to be given to the children of his servants.

Gentlemen of benevolent spirit, who wish to make the lower orders of their fellow-creatures comfortable, though they would scarcely be inclined to detach a few acres from farms once consolidated, to be lett as cottage tenements to labourers;—yet, in the present rage for enclosing waste lands, a favourable opportunity offers for putting such a desirable scheme in execution. An allotment of waste land, in a convenient situation, can more easily be divided into regular and proper sized fields than any old enclosures.

The following plans* of cottages (See *Plate* II.), and variously sized tenements, divided into fields, with the rotation of crops to be pursued;—are submitted to the consideration of those who have it in their power to add to the happiness, and to excite the industry, of one of the most useful, because the most necessary, classes of society.

Were this agrarian system more generally adopted,

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* Recommended by Mr. Daniel of Varchwell Hall, near Welsh Pool.

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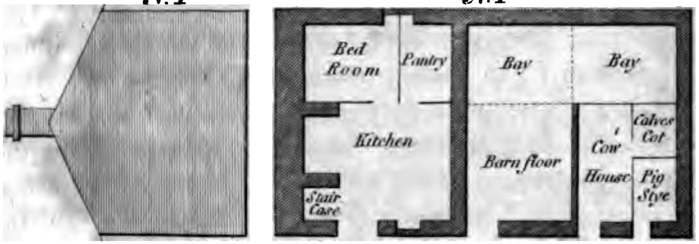
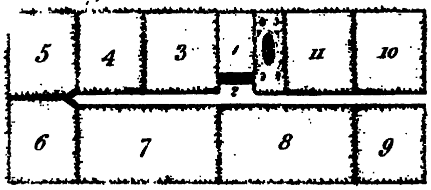
GROUND PLAN and GABLE END of A COTTAGE.

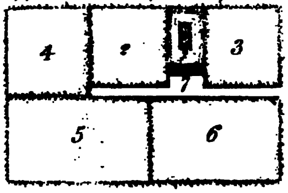
No. 1 No. 1



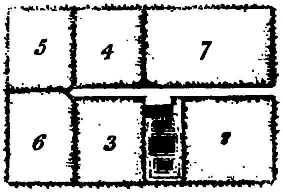
Plan of a Cottage Farm of Nine Acres
of the supposed value of £2 per Acre to enable the Occupier to keep
a Cow and a Pig & the remainder to be under Tillage.



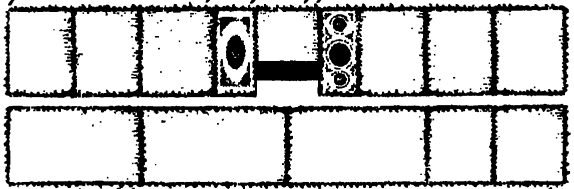
No. 3 Farm of Six Acres
of the supposed value of 1^L.1^s per Acre



No. 4
same Acreage & value as No. 3

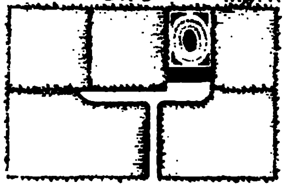


No. 5. Intended for two Tenements by making the Cottage of double dimensions
quality of soil and rotation of Crops supposed to be the same as No. 3

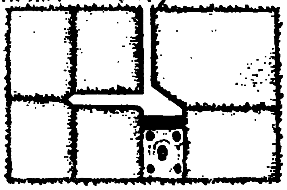


Nos. 6 & 7 supposed to be of the same size and quality as Nos. 3 & 4 but adapted to different situations.

No. 6



No. 7



Neele sc. Strand.

Scale of Chains

Published 1st Sept. 1810 by R. Phillips New Bridge Street

its beneficial effects upon society would be quickly visible;—in reducing the poor-rates;—in encouraging an efficient, self-supporting, population; by diminishing the number of the present spiritless race, who are paupers in perpetuity from generation to generation;—and, what is still more desirable, their morals would naturally improve with their circumstances.

It may be argued, that small *arable* tenements can by no means suit the circumstances of the occupiers. In many parts of the island, where reciprocal good offices between neighbours are little known, this might be a strong objection; but in this district the case is otherwise. The poor labourer is seldom denied his neighbour's team to plough his garden, or to carry his fuel; and the only return expected by the farmer, is the labourer's assistance for a day in the corn harvest. Even where this kind of love-ploughing, as it is called, cannot be procured to the extent necessary for four or five acres, a team might occasionally be hired; or an exchange of work might take place between the team-owner and labourer.

Specification of the Acreage, and Rotation of Crops adapted to Plan No. II. Rent 14s. per Acre.

No.	A.	R.	P.	1st Year.	2d Year.	3d Year.	4th Year.	5th Year.	6th Year.	7th Year.	8th Year.	9th Year.
1	0	3	0	building, garden, orchard, and fold								
2	0	1	10	lane								
3	0	3	0	fallow or buck-wheat	wheat	turnips	barley or oats	clover, &c.	ley	fallow or buck-wheat	wheat	turnips
4	0	3	0	wheat	turnips	oats or barley	clover, &c.	ley	fallow or buck-wheat	wheat	turnips	barley or oats
5	0	3	5	turnips	barley or oats	clover, &c.	ley	fallow or buck-wheat	wheat	turnips	barley or oats	clover, &c.
6	0	3	5	barley or oats	clover, &c.	ley	fallow or buck-wheat	wheat	turnips	barley or oats	clover, &c.	ley
7	1	2	0	pasture and hay alternately, or otherwise								
8	1	2	0									
9	0	3	0	clover, &c.	ley	fallow or buck-wheat	wheat	turnips	barley or oats	clover, &c.	ley	fallow or buck-wheat
10	0	3	0	ley	fallow or buck-wheat	wheat	turnips	barley or oats	clover, &c.	ley	fallow or buck-wheat	wheat
11	0	3	0	grass	ditto	ditto	ditto	ditto	ditto	ditto	ditto	ditto
Total	9	1	20									

Specification, Rotation, &c. adapted to No. III. Rent 1*l.* 1*s. per Acre.*

No.	*A.*	*R.*	*P.*									
1	0	1	20	building, fold, garden, orchard, &c.								
				1st Year.	2d Year.	3d Year.	4th Year.	5th Year.	6th Year.	7th Year.	8th Year.	9th Year.
2	0	3	20	barley	turnips or potatoes	wheat	barley	clover	wheat	barley	clover	wheat
3	0	3	20	turnips or potatoes	wheat	barley	clover	wheat	barley	clover	wheat	barley
4	0	3	32	wheat	barley	turnips or potatoes	wheat	barley	clover	wheat	barley	clover
5	1	2	0	pasture or meadow								
6	1	2	0	meadow or pasture								
7	0	1	0	lane in grass								
Total	6	1	0									

Specifications, &c. adapted to Plan No. IV.

No.	*A.*	*R.*	*P.*										
1	0	2	0	building, fold, garden, and orchard									
				1st Year.	2d Year.	3d Year.	4th Year.	5th Year.	6th Year.	7th Year.	8th Year.	9th Year.	10th Year.
2	1	0	0	barley	turnips or potatoes	wheat	barley	clover	wheat	barley	clover	wheat	barley
3	0	3	0	turnips or potatoes	wheat	barley	clover	wheat	barley	clover	wheat	barley	clover
4	0	3	5	wheat	barley	potatoes & turnips	wheat	barley	clover	wheat	barley	clover	wheat
5	0	3	5	hay and pasture alternately, or otherwise									
6	0	3	0										
7	1	2	0	hay									
8	0	0	30	lane in grass									
Total	6	1	0										

N. B. In the above rotations, Nos. III. and IV. potatoes and turnips are prescribed only for the three first years, in order to bring the soil to a proper state of tilth: afterwards the occupier may follow his own discretion.

Though the general cry, in unison with the too general practice, is against granting small allotments of land to cottagers; yet several persons of the highest respectability, thinking seriously upon the subject, have given their sentiments decidedly in favour of it. *See a publication on the State of the Poor and Population*, by Sir F. Morton Eden, Bart. *See* Communications to the Board of Agriculture by T. Estcourt, Esq. M. P., giving an account of the result of an effort to better the condition of the poor, in the parish of Long Newnton, by allotting to each poor cottager an acre and a half of land, at the rent of 22*s*. per acre, under certain regulations. The result, after four years' experience, seems to be so satisfactory as the most sanguine friend of the poor could wish. *See* also, a Communication from the late Sir W. Pulteney, Bart. to Lord Sheffield ; giving an account of a cottager's cultivation, on Pulley Common, in Shropshire. This cottager's tenement consists of about 512 square yards, somewhat more than one-ninth of an acre. The spade and the hoe are the only implements used, and those chiefly by his wife; that he may follow his daily labour for hire. The plot of land is divided into two parcels, whereon she grows wheat and potatoes alternately. In the month of October, when the potatoes are ripe, she takes off the stalks of the plants, which she secures to produce manure by littering her pig. She then goes over the whole with a rake, to collect the weeds for the dunghill. She next sows the wheat upon the surface, and then takes up the potatoes with a three-pronged fork, and by the same operation the wheat-seed is covered deep. She leaves it quite rough, and the winter frost mellows the earth, and by its falling down in the spring it adds vigour to the wheat plants. She has pursued this alternate system of cropping for several years, without any diminution of produce. The potatoe crop only has manure. In 1804, a year very noted for mildew, she had 15 Winchester bushels of wheat from 272 square yards; being four times the general averaging crop of the neighbouring farmers. It is to be wished such instances of cottage industry were more frequent; and more frequent they would be, were proper means made use of to invigorate the dying spirit of exertion in the labouring class.

CHAP. IV.

MODE OF OCCUPATION.

SECT. I. AND II.—SIZE OF FARMS—CHARACTER OF FARMERS—RENTS.

IN the beginning of the eighteenth century, farms were much smaller than they are at present. Since that time, the practice of reducing three or four, and in some instances nine or ten tenements into one, has become prevalent. The lower class of people urge many specious, though perhaps untenable, arguments against this monopoly. But "accumulate them still, in a quintuple ratio," is the common cry of the majority of Surveyors of Counties; in which several join as it were for the sake of concert. It is true, that the will of a land-owner, in unison with the avarice of an engrossing farmer, can reduce a dozen farms of a moderate size into one; but whether such a reduction be not the reverse of political prudence, laying aside a secondary consideration, called *humanity*, remains to be decided. The decision should be drawn from arguments resting on the rational basis of philosophy, and not from the reveries of self-interest. Although wealth, in the course of revolutions in politics, may now be admitted as a main pillar in the state; yet *that* wealth should be valued, not in proportion to its national aggregate, or quantity in the abstract, but as it is widely and generally diffused. An analogy exists between monopoly, in all its forms, and a macrocephalous constitution, which never can possess the energy of a body symmetrically proportionate.

In North Wales, indeed, there is not yet much cause to complain of the extravagant size of farms. The largest, of cultivable land, are about 600 acres; and of such there may be about a dozen in the whole district, mostly the property of their respective managers; who, in general, intend letting about 300 acres of each, as soon as they are brought to a proper state of cultivation.

Next to these, farms, in the best vales, are from 60*l.* to 400*l.* a year; at the average rent of 20*s.* per acre. Some few farms, by late valuations, have been advanced to 30*s.* per acre, and more.

In the smaller dales, and in the hilly parts, from 20*l.* to 100*l.*; at the average rent of from 10*s.* to 15*s.* per acre.

In the mountainous parts, from 10*l.* to 80*l.*; at the average rent of from 2*s.* 6*d.* to 7*s.* per acre. There are some extensive mountain farms of about 1000 acres, letting at no more than from 1*s.* 6*d.* to 2*s.* per acre.

It is however to be lamented, that the larger farms are, generally, found in the vales, and the smaller ones in the uplands; whereas, in good policy, the reverse of this should take place. A few acres of good land, such as that of the vales, would sustain a family comfortably; and the expense of cultivation would be comparatively small. Were the uplands thrown into large farms, they would be taken by men of large capitals, who only could afford to bestow on them that improved system of husbandry, which in their present neglected state they stand so much in need of.

Farm-rents seldom exceed 20*s*. per acre*; but detached pieces, in favourable situations, are advanced, by competition, to various rents, from one guinea to six guineas per acre; which ought to be considered as quadruple the real value.

Rents are always paid in money, on two half-yearly payments; but, in several instances, the first payment is not made until the second has become due; and so on, the tenant being, at every payment, half a year in arrear.

In giving a sketch of the character of *Farmers*, the greater land-proprietors should take the lead. They merit that honourable, though humble, appellation; for of late years, since agriculture has become a fashionable study, as well as amusement, much to their credit, and the good of the public, the majority of them have spent a great part of their time and fortune in rural improvements; in preference to the noble hazard of faro, or the too alluring chance of the turf.

Lawyers, clergymen, and others, having the advantage of education, join with the farmer in introducing recent improvements into the country. Some prefer farmers who are bred to the occupation from their infancy, as the best agriculturists. In Norfolk, and other places, where good farming is generally understood and practised, it may, and ought to be so: but where systems of error decidedly prevail, reformation will hardly be promoted by mere farmers, but by persons who read, and have travelled, and seen the practice of other parts; men who have been brought up to physic, law, commerce, or even mechanical trades.

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* Since writing the above account, the rent of land has, in general, been much advanced. It is indeed upon a regular advanee. Observation reports about 6*d*. per pound per year. The late charge on property may be considered, in theory, as an equable mode of taxation; but experience shews that the assessments under schedule A can easily be added to those under schedule B, and both thrown together upon the tenant. How long he can bear it, time will shew.

Farmers, properly so called, are, as we may naturally expect them to be, rather too tenacious of old customs. It is however illiberal to charge them with *obstinacy* in delaying the adoption of *pretended improvements:* for, as it is not all gold that glitters, neither is one half of the patent implements, and machines, or one-tenth of the writings of visionary theorists, better than lumber and trash; for which the farmer should not throw away his hard-earned money, before they are put to the test of experience, by those who have opulence enough to bear disappointment; and who from the advantage of superior education, may be better qualified to form a judgment of the probable effects. Shew the farmers their true interest, and, in general, their minds are as open to conviction, and as susceptible of reason, as any other class of men whatever.

SECT. III.—TITHES.

THAT private property is inviolable, no man who lives under a free government will be hardy enough to deny: that tithes are a species of private property, is equally indisputable. No species of property can have its origin traced beyond presumed common consent, permitting occupancy; which, sanctioned by prescription, is at length admitted, ratified, and established as inviolable by positive law. No peer in Britain has a title to his estate anterior to this. Owners of tithes, not insisting upon their right, *jure divino*, place the inviolability of their property in them on the same basis; which no power but that of the Legislature can reform, and no instrument but the fell hand of anarchy can undermine.

It has been asserted in a former Report of this district, that there is a greater proportion of pasture than corn lands, owing to the former being liable to a much lesser tithe than the latter*: but another cause may be assigned, the land being better adapted for grazing, and consequently more profitable to the occupier. There are several tithe-free farms, and even tithe-free parishes, within the district. In these, a theorist of a certain cast would expect to find superior cultivation: but in this he would be completely disappointed.

In some parishes, the tithe of their own grain is left to the growers; in others, one person takes a township, and collects it in kind: and the custom, in many parts, from time immemorial, is to take the eleventh instead of the tenth, as a compensation to the farmer for harvesting the grain fit to be carried.

Hay is tithed in kind in some places; in others, an easy composition per acre, or per pound rent, is accepted. A modus of *2d.* or *4d.* per farm, frequently precludes the tithe-owner's claim; even where the crop of hay may be worth from 100*l.* to 200*l.*

When we consider that, upon an average of the whole district, not above one-twentieth, or from that

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[*] Mr. Kay, in Montgomeryshire, p. 7; in Flintshire, p. 8. As a refutation of the assertion, see subsequent part of this Report, on the increase of lands in tillage.

to one-thirtieth, of titheable articles is exacted, we must naturally expect the clergy to live upon friendly terms with their parishioners; and so it is, litigations seldom or never occur.

A clergyman in Caernarvonshire, having introduced the turnip and cabbage husbandry into that neighbourhood, exacted not the least acknowledgment from his parishioners, who followed his example, and had yearly from nine to fifteen acres each of ruta baga, and other green crops; saying, that he would be without any tithe whatever rather than check improvement in its infancy. There are several other instances of liberality in the clergy; some of them discount the tenth of their parishioners lime bills: but it must be owned, that this is not in parts where they lime at the rate of 5*l*. per acre. One spirited landlord, being proprietor of every inch of soil in his parish, has taken a lease of all the issuable tithes therein for twenty-one years; which he re-lets to his tenants; uplands at 2*s*. and lowlands at 3*s*. per pound rent.

The advocates for the commutation of tithes in kind, speak of substituting some *equivalent* in their stead; which undoubtedly "*is a consummation devoutly to be wished:*" but what that equivalent should be, has not, as yet, been satisfactorily published. Money in the national fund is no equivalent, owing to its fluctuation in value: and whether throwing a portion of the national territory into mortmain be a politic or an impolitic act, must be left for statesmen and lawyers to decide. In the time of the feudal system, lands in mortmain debilitated the state; but now, since money is reckoned the sinews of government, and taxes are imposed upon all lands without distinction, the case may be altered.

SECT. IV.—POOR-RATES.

See Poor, Chap. XV. Sect. VII.

SECT. V.—LEASES.

SEVERAL men of reflection halt, very much, between two opinions upon this subject. Leases, within this district, do but very little good, where they are granted; and nevertheless, in theory, they seem absolutely necessary. That tenants who pay full rents for their farms, and, in some instances, after having been induced by fair promises to undergo great expenses in improvements, should afterwards be forced to quit at six months' notice, without equitable reimbursements,—and without any other cause than the whim of the landlord or the venom of his bailiff;—are circumstances that must fill a benevolent mind with indignation. Full of these ideas, and of the plausible schemes of Lord Kaimes, of Dr. Anderson, and of others, on the subject, the Writer of this Report, set out upon his his Survey of North Wales, determined to join in such a seemingly laudable cause, as that of recommending the general adoption of leases: but to his total discomfiture, he found not only universal opinion, but stubborn facts, against him.

He states the following data, in order that others may draw what inferences they please from them.

In Anglesey, the Earl of Uxbridge has granted some leases; Lord Viscount Bulkeley a great many; O. P. Meyrick, Esq. as far as 5000*l.* per annum; Sir Hugh

Owen's estate is all under lease. Most of these leases are for lives; and the term adopted in those which Sir John Stanley granted to his tenants about the year 1798, is, the longest life, landlord or tenant. Half a dozen estates more might be particularized within the island, under lease; but these are enow, when it is added, that the same race of rushes, dock, and furze, encumber the same acres of land; and the same race of fettered sheep parade the summits of the turf-fences now, as when the terms of the leases commenced: both tenants and lands remain in *statu quo*.

In Caernarvonshire, almost all the tenants on the Vaenol estate, consisting of about 28,000 acres, had leases for twenty-one years, which expired in 1799; and the land as unimproved as ever. The proprietor, Thomas Asheton Smith, Esq. then determined not to repeat the lease experiment: even some of his leaseholders, regardless of the remainder of the term, had actually emigrated to America before their leases expired. Lord Viscount Bulkeley has leased a great part of the Vale of Aber, opposite Beaumaris, to his tenants, for lives. Hearing that they raised a continued succession of white crops, for many years, without manure, and that the land did not require such indulgence, the Writer of this Report went to examine into such a curious phenomenon in tillage; and found the soil to be a light pebbly loam, the crops scanty, and according to his expectation, over-run with weeds. Fields belonging to different farms are here very much intermixed; and are moreover too small, and irregular in their shape: streams of water are never disturbed by being turned out of their ancient courses.

In Meirionyddshire, and Caernarvonshire, the father of the late Mr. Price, of Rhiwlas, granted a great many leases for lives; but, hitherto, not one tenant has taken the opportunity of benefiting by them.

In the other three counties, leases are entirely out of repute; not only by self-interested men, but by the most liberal, who have the good of their tenants, and of the public, at heart.

It cannot be denied that leases have done good in Scotland. We are therefore driven to the necessity of supposing that the Scotch and Welsh tenantry consist of very different kinds of beings. It is to be wished we had it in our power to add, that the latter were the better sort. However, let not the North Walians think that they are hereby condemned in the gross, as unworthy of leases: far from it; as there are hundreds of intelligent farmers deserving all the encouragement their landlords can give them. Those who have leases, and do not profit by them, should change places with many others who are tenants at will: they would then occupy their proper stations. "Dogs should be sent out of the manger that oxen may eat the hay." Mr. Probert, in managing the Halston estate, at Mowddwy, granted leases for twenty-one years, to be renewed at the expiration of the term, provided the tenants benefited by their leases, and improved their respective farms. Some of them were lately deemed worthy of new leases, and the rest were discarded. That part of the country is much improved since this system took place. Some pains should be taken in discriminating the different capacities and dispositions of tenants; and every one should be treated according to his merits: some *should* and *ought* to have leases; others, *not*, by any means. Our nobility and gentry are in general scrupulously cautious not to admit servants into their families, without proper recommendations from those they served last; but they would serve themselves and the public better, were they, or their agents, to require some vouchers from the tenants they admit upon their estates, besides the bare recommendation of being able to pay their rents. Some check ought to be laid upon them, to prevent their grasping at farms too extensive for their capitals. The very circumstance that renders the Welch leases ineffectual, is the *want of capital*: and what enhances the evil of this want, is the ignorance of many farmers in the right application of what small capital they have. By tilling too many acres, they, as well as the public, suffer loss in every acre. Many a farmer, who has means barely sufficient to manage a farm of 50*l.* a year, tolerably well, thinks a farm under 100*l.* or 150*l.* beneath his notice: and granting a lease to such a tenant, who has not one-fourth of the capital requisite to carry on improvements, would be preposterous.

Lord Penrhyn, some years back, had recourse to a method of remedying the deficiency of capital in his tenants; which, for the public good, ought to be universally adopted. When either of his Lordship's tenants, whether renting under lease or not, saw the necessity of improvement on his farm, in draining, clearing of stones, or fencing, and had not the means of putting it in execution himself, he applied to his Lordship's agent, who, on viewing the ground, determined whether the profits to be expected would be adequate to the expense or not, and acted accordingly. If the improvement was agreed upon, and made, five per cent. the expense was added to the tenant's rent, from the time undertaking had been completed. On one farm, where fifteen acres covered with stones of vast size had been cleared, the tenant could not have afforded to pay 250*l.*

which was the amount of the expense; but he is money in pocket every year, by paying 12*l*. 10*s*. additional rent, which is the five per cent. interest of the expenditure: and the landlord, by pursuing this method, disposed of his money more profitably than if he had bought fresh estates at twenty-five, or even twenty years purchase. These fifteen acres must have been of very low value prior to the improvement; otherwise 16*s*. per acre additional rent would have been too great an advance.

Several other proprietors have since adopted the same plan. The improving agent goes over the estate, farm by farm: new roads are formed,—waste corners planted,—crooked hedges straightened,—meadows irrigated,—wet lands drained, &c. On some estates, the whole rents of farms have been expended upon them in improvements, within the year, to the satisfaction of prudent proprietors, who calculate upon future returns; but these are speculations ill-suiting the Newmarket gentry, or the loungers of the metropolis. The per centage upon these modern improvements, in addition to the simple rent, has lately advanced from 5*l*. to 7*l*.; and to 7*l*. 10*s*. upon buildings.

Leases for lives are recommended to be granted in preference to those for a definite term of years: the expiration of the term being uncertain, the tenant would be disposed to manage his farm well to the last.

In Montgomeryshire, some landlords grant leases for a few years; three, seven, nine,—seldom fourteen; and very rarely, if ever, twenty-one.

Of late, the general practice is for the landlord and tenant to sign an agreement called a *lease from year to year;* the occupier being, to all intents and purposes, only a tenant at will, as to continuation in his farm;

having power to give, and liable to receive, notice to quit, at the expiration of each succeeding year. The advantages of these kinds of contracts, are, apparently, all on the landlord's side; excepting a supposition that the several obligations upon the tenant to fulfil the respective covenants for the management of his farm be productive of mutual benefit. The landlord specifies the penalty to be paid by the tenant for the breach of every article of contract; whether it be omission of performing what was required, or commission of what was prohibited. And these penalties are agreed to be recovered in the same manner as arrears of rent, by distress and sale of goods, &c. without having the usual recourse to an action at law. Professional gentlemen, of a certain description, are not likely to have been the original framers of these kind of contracts; and, perhaps, still less likely to permit them to continue.

The following particulars of a lease of this kind, with the penalties annexed, may throw some light upon what is considered as *good* management upon a farm in the lowlands,—and what is *not*.

1. *Times of Entry upon the Premises.*

Clover and grass fields sown the preceding spring,	Oct. 1st.
Wheat stubbles for fallowing, and stabling for horses,	Dec. 1st.
Hay grounds, and gardens,	Feb. 2d.
All other grounds, excepting a boosey pasture for the out-going tenant's cattle,	March 25th.
House, &c.	May 1st.

2. *Rights or Powers reserved by the Landlord.*

To fell, carry off, &c. any timber; paying equitable damages;—to enclose and fence coppice and plantations upon any part of the premises; the annual value of the land so enclosed to be determined by reference, and deducted out of the rent;—landlord to complete the first fence, and tenant to preserve and leave the same in good repair:—to build, rebuild, make new roads, fences, drains, ponds, floating gutters, &c. upon any part of the premises: to be at liberty to provide, at the tenant's expense, clover or any other grass seeds, to be sown by the tenant, on any land intended for meadow or pasture: and the tenant not to plough the same again without consent, during his holding.

3. *Tillage.*

1. *Turnips*—Tenant to sow each year   acres with turnip-seed: land to be well manured with twenty cubic yards of rotten dung, per acre; and to hoe and keep clean the crop, under a penalty of 40*s*. for each acre not sown, or not kept clean.

2. *Wheat, &c.*—Not to sow winter grain immediately after turnips or potatoes (without consent), but to sow such grounds with lent grain and proper grass-seeds the following spring; under a penalty of 20*s*. for each of such acres sown with wheat.

3. Not to sow with winter corn a greater number of acres than what has been laid down in clover and grass seeds the preceding spring.

4. Not to give less than thirty-two bushels (of eighty quarts) of good clod lime to each acre sown with winter corn.

5. Not to sow winter corn upon a brush, excepting it be the brush of a crop sown upon a ley the preceding spring.

6. Allowed to sow wheat on clover ley of the first year after turnips, managed as aforesaid, and putting twenty bushels of lime upon each acre; tenant to have the same share of corn from this crop as from a summer-fallow, the last year of his holding.

7. Not to take above three successive crops of grain from any part of the lands; but to sow with the third crop 15lbs. of red clover seed, with other grass-seeds in proportion, upon each acre; under the penalty of 40*s*. per acre for the white crops of the fourth year; and 4*l*. per acre for neglecting to sow the prescribed quantity of seeds.

4. *Meadows and Pastures.*

1. Not to permit any cattle (young colts and calves excepted) to graze on fresh clovers, &c. from the 1st of October to the 1st of April; under the penalty of 10*s*. per acre.

2. Not to permit cattle, &c. to enter any of the fields or meadows under irrigation, or prepared for being so (excepting upon hard frosts) between the 1st of December and the 5th of April; under the penalty of 20*s*. per acre.

3. Not to plough, &c. any old pasture or meadow ground, without consent, under the penalty of 4*l*. per acre.

4. Landlord may require the tenant to plough or break up any pasture or meadow ground, and to re-lay the same with the most convenient expedition, and as level as possible, with proper grass-seeds, for irrigation:

tion: tenant not to plough the same a second time during his holding.

5. *Timber, Underwood, &c.*

1. Tenant not to permit cattle or sheep to graze in coppices, plantations, &c. set a-part by the landlord; under the penalty of 5*l.* for each offence.

2. Not to shred or otherwise damage trees, tops of pollards excepted (and those for fencing-trowze only), under the penalty of 5*l.* for each tree so damaged.

3. Not to permit others to cut any saplings, under the penalty of 20*s.* for each sapling; nor any kind of underwood, &c. under the penalty of 15*s.* for each burden.

6. *Fences.*

1. Tenant to secure the quick fences around the winter corn fields, with a ditch foss—to plash well grown quicks—and to repair gaps of dead fence with new quicks, between the 1st of October and 1st of April, under the penalty of 5*s.* for every rood so neglected.

7. *Fuel.*

1. Tenant to procure half a ton weight of coal per year, for each cow he shall milk on the farm, and use the same for the purposes of his kitchen and dairy.

8. *Manure.*

1. Tenant not to sell or otherwise dispose of the farm-yard dung, or any hay, straw, &c. not exempting the produce of rented tithes, &c. under the penalty of 30*s.* for each load.

2. To carry all the farm-yard manure that shall remain after sowing turnips, upon the meadows or pasture lands, between the 24th of June and 20th of August, in each year, under the penalty of 10*s*. for each load so neglected.

9. *Miscellanies.*

1. Tenant not to relet or assign over the premises, or any part thereof, without consent in writing; under the penalty of a sum equal to one year's rent.

2. Landlord to expend a certain sum, in proportion to the rent and condition of the farm, each year, for four successive years, in the improvement of the farm: tenant to pay seven per cent. per annum, upon such sums of money as shall be laid out by the landlord over and above the certain sum specified.

10. *Allowances to the Tenant, the last Year of his holding.*

1. For farm-yard dung carried and spread upon meadow or pasture land, between the 24th of June and 20th of August; provided the turnip crop had been served with its prescribed quantity of twenty cubic yards to the acre, and the plants well hoed and cleaned: —a sum equal to three-fourths of the value.

2. For planting quicksets around the winter corn, and preserving the same from damage;—three-fourths of the value of the expense of setting.

3. For clovers and grass-seeds sown in the spring, without being grazed by cattle or sheep, after the 1st of October,—full value, or prime cost of seeds.

4. For lime carried to the farm after the 24th of June, and not being for turnips;—25*s*. for every wag-

gon load of thirty-two bushels,—more or less, according to distance from the kilns.

To conclude this section on leases;—the anti-party says, that to insist upon the necessity of leases, supposes a prevailing Jewishness among all ranks of men: it is, they say, a libel upon human nature. Mutual confidence, they add, between landlord and tenant, is far superior, and more to the advantage of each, than any written contract. Their opponents beg their pardon, and say—that this *mutual confidence*, which renders leases unnecessary, is but a mere phantom; supposed to exist to-day, and gone for good to-morrow. Indeed, instances too decisive, as to the case in point, may be produced. Human nature must bear the libel until itself be improved: for the golden age is past; and the millenium of universal integrity has not yet commenced.

In drawing leases, or rather contracts, one general form is too frequently copied, and its several clauses are as it were dragooned to suit all situations and circumstances, however various. Lime is the *sine quâ non* of the lease maker. Upon a sheet of paper, the difference between five miles and thirty miles distance from the lime kilns is very trivial. Lime must be had, or the landlord is ruined. A sage Roman[*] being asked —"What is the chief principle in tillage?" answered —"*to plough well.*" "What is the second?"—"*to plough well.*" "What is the third?"—"*to lay on dung well.*" But on the contrary, the answers of our modern lease makers to these three questions would have been—"lime—lime—lime." Even *lime* may become an an antiquated article with them; and its place in leases be supplied by the *patent prepared gypsum*, or superfine powdered *charcoal*.

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[*] Cato, C. lxi.

SECT. VI.—EXPENSE AND PROFIT.

FARMERS, in general, are found too reserved to fill up the blank of this Section. Gentlemen who may have the curiosity of keeping farming journals and ledgers, may not be inclined to communicate the contents.

CHAP. V.

IMPLEMENTS.

THE first implement in practice, as well as of importance, is the *plough*. That kind which was universally used in North Wales, prior to the introduction of the Lummas* plough, about the year 1760, still obtains through a great part of the three counties of Anglesey, Caernarvon, and Meirionydd. The mould-board is a plain plank, which turns the plit over by its extreme length; and, by the holder pressing much on the left handle, its nether edge forms an acute angle with a line parallel to the surface of the soil; by which a feather-edged plit is formed, producing, in ley-grounds, not a sufficient mould for the harrow. The length of the beam is seven feet six inches; and the surface resting on the ground, from the heel to the point of the share, measures four feet. The friction occasioned by this great extent of surface, is a material obstacle to the draught. In sowing under furrow, it is however preferred to the Lummas, by several farmers, and for these reasons: the latter, by the great twist of its mould-board, acting on the *lateral-wedge* principle, lays the plit too flat; the former, operating on the principle of the *under-wedge*, breaks the cohesion of the soil, and lays it, in a narrow ridge, light upon the seed. In places not too much exposed to the north and east winds, a light harrow used after sowing under furrow, would be of service, to regulate the depth of soil upon the seed: clearing the furrows in moist soils, would be the only additional trouble.

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* It is called Lummas, by writers on agriculture; and Lomax by the peasants: perhaps Lomax was the name of the introducer.

In the counties of Denbigh, Flint, and Montgomery, it is now hardly known, except by name, and called the *old-fashioned plough*, to distinguish it from the later introduced Lummas, which is a variation of the Rotheram, invented about 80 years since.

The dimensions of the Rotheram, as specified in Mr. Foljambe's patent; and of the Lummas, as generally made, upon its introduction into North Wales, stand thus:

	Rotheram.		*Lummas.*	
	Feet.	*Inches.*	*Feet.*	*Inches.*
Length of the beam	6	0	6	6
From the end of the beam to the point of the share	3	0	3	0
Length of surface resting on the ground	2	10½	2	11
Height of the beam from the ground, at the coulter mortice	1	8	1	8
Ditto, at the fore-end of the beam	1	7	1 1	2* 0†
Height of the left handle, or stilt, from the ground	2	11	2	11
Width between the handles	2	6	2	4½
Width of the heel at the top of the mould-board	1	4	1	5
Ditto at the bottom	0	9	0	8
Ditto of the share, behind the wing	0	3½	0	4

The loose-ironed Lummas, being of an easier draught, is better adapted for light soils, especially on sidelands; the lock-ironed, being much firmer, is to be preferred in stiff clays, stony soils, and rooty ley-grounds. But notwithstanding this obvious distinction, so far doth custom over-rule judgment, that the loose-ironed plough prevails in Denbighshire, even in the strongest land; and the lock-ironed is generally used in Montgomeryshire, however light the soil.

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* For horses. † For oxen.

In the foregoing table, the height of the fore-end of the Rotherham beam, or muzzle, from the ground, is 19 inches; that it should be reduced in the Lummas to 14 inches for horses, and 12 inches for oxen, is no proof of a mechanical genius for improvement. A low muzzle must make a greater angle, and consequently a greater obstruction, in the line of traction from the point of draught on the shoulder of the horse to the point of resistance in the soil. This error has been since corrected; the general height, at present, from the base to the centre of the beam, being from 15 to 15½ inches. To ease the draught still further, as well as to lessen the pressure upon the hindmost horse, when the horses draw in a line, they should regularly diminish in height, from the leader to that hooked to the plough; and the iron, called the crank, upon the cart-saddle, should be of an adequate length, so as to produce the least possible angle in the line of traction.

The reduction of the width of the heel at the bottom, from nine inches in the Rotheram to eight inches in the Lummas plough, was a happier improvement, in strong ley-soils; though not so material in the lighter kinds.

A plough, drawn by two horses a-breast, called the Scotch plough, has been lately introduced into this district from Scotland; and become much in vogue. The chain being hooked nearer to the point of resistance in this plough than in any other, gives it, in that respect, decided superiority. It is too well known to need any further description. The extreme breadth of its heel, however, was an objection. The plough might at first be introduced from a part of Scotland where light soils were predominant; but here, in strong clayey loams, a plit from 12 to 15 inches broad, laid quite flat, yielded too scanty a staple of mould, either to cover the seed or to cherish the growing plants. This occasioned the reduction of its heel to eight inches; which should be considered as a standard width in strong soils; as it lays the plit so that its surface forms an angle of about 45 degrees, yielding a sufficiency of mould by the operation of the harrow.

As it is ridiculous, on one hand, to see four or five strong horses, in a line, ploughing free-working soils; so on the other hand, it appears to be hard labour for two horses a-breast, sometimes of unequal size and strength, to work constantly on strong soils: some happy medium between waste of strength and excess of labour would be desirable. On large farms and varieties of soils, different kinds of ploughs and methods of working would be expedient. It may be calculated that there is a saving in driving down to death (as the farmers say) two horses a-breast in three or four years; as their prime cost will have been liquidated within that space of time, by the lesser expense in keeping of two horses than four, and other considerations; but a feeling mind cannot divest itself of the idea of cruel treatment to the useful animals, who are thus, as it were, hurried down the precipice of their short existence.

The mould-board of the Scotch plough gives general satisfaction. Those fixed to the Lummas are all procured from the English founderies; and are of various shapes and sizes. Some lighter, with a lesser twist, adapted to the operations of fallowing, ploughing stubbles, and sowing under furrow: others are heavier, and of greater twist, to kill[*] the plit of a tough ley. Those mostly approved of in Montgomeryshire, &c. are Nos. 28, and 26; and of late, a third, without any mark of distinction, seems likely to supplant the three. The even wearing of a mould-board over the whole of its surface, is a proof of the appropriateness of its shape, &c.; but whenever one part wears to a thin edge, before another part be scarcely cleared of its rust, it is an indubitable sign of its wrong shape, or of its being badly fixed, or both together.

Lummas ploughs are expeditiously made in those parts of the district where they are in general use. It was of late a common thing for the plough-wright to carry his tools to the distance of six or seven miles on a morning,—then to fix upon the ash-tree in the wood,—to fell it, and make it into a plough, well finished, and afterwards to return home by daylight; and all for 2*s*., including victuals: but now the times are changed, and not for the better.

Lummas ploughs are sold, completely furnished, according to strength of wood and irons, from 35*s*. to 45*s*. Scotch ploughs, on their first introduction, sold high, the plough-foot being of cast iron; now it is made of wood, and owing to rivalship between the makers, its price is reduced nearly to an equality with that of the Lummas. The plough furnished only with its mould-board sells for 25*s*., the additional irons may be supplied by the country smiths for from 15*s*. to 20*s*.

Some writers on agriculture say, that no axiom in the mathematics is more evident, than that the fin of the share and the heel of the plough should be of an equal breadth: but rustics, who are no adepts in the abstruse sciences, appeal to axioms in ploughing, and say, that the fin should not be as broad as the heel; otherwise, in strong ley-grounds, the plit cannot be so fairly laid; neither, in some kinds of soils, one-furrow leys, &c. will it bear the harrow as well.

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[*] *Lladd y gwys*—*i. e.* to *kill* the plit—to lay it close and even.

Fancy, habit, and a kind of native attachment to provincial implements, contribute much to bias the mind of farmers in the choice of their ploughs. A gentleman, native of Herts, though, in general, of superior judgment, yet reprobated the lightness of the Lummas plough used by his neighbours, saying that it was fit only to exercise the agility of cats; and continued, during a long residence in this district, to use exclusively his clumsy favourite, the Hertfordshire plough; being nearer his idea of perfection, according to mathematical principles, than any other; "uniting strength, ease of draught, and efficacy of operation."

Other ploughs used by individuals, either for fancy or experiment sake, are the Norfolk;—the Kentish, and Sussex, turn-wrests;—single-wheeled, and double-wheeled, ploughs;—Ducket's wheel and flay;—Shropshire swing, and ditto double-furrowed, for expedition in fallowing.

Harrows.—The oldest kind of harrow now known is of a triangular shape. It is now generally out of use, excepting by some upland farmers for harrowing in grass-seeds upon dry soils, across the furrows; and for that purpose it may perhaps be the most eligible of any: as the construction of its bulls renders it easy for the maker to fix the tine so as not to follow each other's track.

Several varieties have at times been introduced, which are generally copied from agricultural publications. The harrows in general use are of an oblong shape, and in sizes adapted to any number of horses, from one to four. One side of the larger size (for two are always coupled) is about four feet eight inches long; two feet six inches broad in the fore-end, and three feet four inches behind. This difference of breadth facilitates the passage of the clods from tine to tine: and the longitudinal bulls forming oblique angles with the cross bar at the fore-end, give the tine a greater diversity of tracks, than would otherwise take place, were the bulls at right angles to the cross bar. However, about *one-fifth* of the tine go in pairs in the same track; and not *one half*, as asserted by Mr. Lester to be the case in all common harrows he had seen (Agr. Mag. Nov. 1799, p. 243).

The deficiency of closeness in the tracks of the tines in our harrows, is in the extreme corners; which might be obviated by fixing a small diagonal bull in each, for the support of additional tines. The larger harrows of eight bulls (four on each side), have five tines in each; about ten inches long beneath the wood, and from ten to twelve inches asunder: smaller harrows closer, &c. in proportion.

The contrivances to join the two sides are various. The most approved are those which give the sides the greater freedom for play during their progress, so as to pulverize well the opposite sides of a high-backed ridge.

The draught is in a line diagonal to that of the bulls;

and is either fixed in one corner, or moveable from one side to the other alternately. The former is contrived by having the left-hand trace shorter than the other; and hooked to two fixed staples in the left corners of the sides; the latter by having a piece of iron or wood, called a runner, in length about three-fifths of the breadth of the harrows, connected to them by means of links, and from eight to twelve inches distant. The horses are hooked to a ring sliding freely along the runner, first to the left, then, by turning, to the right; and so on, alternately.

On fallows, and free-working soils, harrowing is easily performed; but on strong leys, the furrows are not always completely broken, so that the oats, or any other grain sown upon them, appear in the divisions of the furrows as if sown in drills; until by tillering, &c. the crop assumes the appearance of broad-cast.

Harrows are generally made of oak, sometimes of ash, both commonly painted with red lead. Excepting the fore-end cross-bars, the hinder ones run through mortices in the bulls; but under a supposition that this weakened the harrows, cramp-bars have been substituted, and fixed upon the surface of the bulls by means of iron pins and screw-nuts.

Scarificators, tormentors, cultivators, couch-rakes, and other implements, forming a long list of articles in improved culture, are introduced, and, generally, approved of.

Cook's and Ducket's drill machines may be seen in several places in garrets, but seldom in the fields. The late Rev. Mr. Wynne Jones of Trev-Jorwerth in Anglesey, had a very simple and cheap turnip-drill, contrived by himself. It is driven like a barrow, on two wheels, 20 inches asunder, and 14 in diameter. The box containing the seed consists of two cones of tin, joined basewise, and fastened to the iron axle which passes through the centre of the box. In one of the cones is an inch aperture, with a cork, to let in the seed; and at the junction of the bases of the cones are punctures, of a proper size and distance, to let it drop as the drill moves and the box turns round. A small iron rake, hung behind the box, covers the seed. The whole machine was made in Anglesey for about 10*s*. or 12*s*.; but in Montgomeryshire, and somewhat improved, it costs at present from 21*s*. to 25*s*.

Rollers for corn are generally solid, sixteen-sided, cylinders of oak, from six to six feet and a half in length, and from 15 to 18 inches in diameter. Double rollers of about three feet length each, are found very convenient, in turning, and in laying an uniform pressure on ridgy land. Rolling of meadows is a practice confined to a few gentlemen. The rollers are sometimes of solid cylinders from two feet to two feet and a half in diameter, weighing about three-fourths of a ton; sometimes of hollow cylinders of plank, and filled with gravel; and a few are made of freestone. Mr. Oakeley of Tan y bwlch, has a jointed cast-iron roller; each piece 30 inches in length, 36 in diameter, and weighing, in the whole, about one ton and a half. Rollers of small diameter are preferred by some, because they press more effectually upon a lesser surface; but others say the difference in that respect is immaterial, and that rollers of large diameters are easier drawn.

Spiked rollers are used, by some farmers, on stiff soils. Knives about six or eight inches long, with shanks to be driven into the roller at proper distances, perform the operation much more effectually than spikes. Jointed shafts, similar to those of a waggon, are preferable to others, in being less liable to break, and more conveniently kept under cover. An iron pin, whose length is equal to the breadth of the shaft, is all the additional expense. Oblong iron nuts, turned across the joints, render the shaft firm, when the roller is to be used.

The vehicles of grain, hay, fuel, and manure, &c. are waggons, carts, and tumbrels. The two former are of two kinds each, one for hay and corn, &c. the other for coal, lime, and such heavy articles. The latter is exclusively the vehicle of farm-yard dung, compost manures, and other substances, such as stone, gravel, &c. that require to be unloaded in heaps. In the lowlands, the hind-wheels of waggons are from five feet ten inches to six feet diameter; and the fore-wheels from four feet seven to four feet ten inches. Length of the chest, eleven feet six inches; breadth three feet nine inches, and three feet six inches; depth two feet four inches. Harvest waggons and carts are furnished with ripples, one at each end, and one on each side. Some waggons have the hind and fore wheels nearly of an equal diameter. The Gloucestershire waggon, for the sake of safety and expedition in turning, has been introduced by some farmers.

Were it possible to diffuse some knowledge of the principles of mechanics among wheelwrights and farmers, the labour of both men and horses would be much reduced. Waggons, for obvious reasons, should have their fore-wheels of a larger diameter than they are commonly made in this district. The common practice of laying as much as possible of the load upon such small fore-wheels, is absurd in the extreme. This is a proposition that may easily be demonstrated on bad roads.

A waggon with its fore-wheels ten inches more than common in diameter, and the pressure of the load mostly upon its hind-wheels, might be extricated from a difficult place by a strength of horses one-fourth less than another waggon equally loaded, but loaded in the common way, and having its fore-wheels of the small ordinary size. The power of a wheel is in direct proportion to its radius, and to the freedom with which it revolves upon its axis. If this axiom be true, why are small fore-wheels, with their revolution obstructed by over-pressure, preferred in waggons?—*Answer:* Upland situations, and hilly roads, gave occasion for the fore-wheels to be of a smaller diameter than would be thought prudent upon level plains. High fore-wheels are drawn with difficulty up hill; and are as difficultly managed in short turnings, except the bolstering be raised to an inconvenient height.

The axletrees in Montgomeryshire are shorter by an inch than in the eastern part of Denbighshire; and shorter there than in Shropshire. The shorter the axletree, the more subject it is to be broken: as a greater distance between the wheels renders the load steadier; and in bad roads less jerking takes place, by which axletrees are generally broken. Wheels in the form of sections of cones, or with a dish, as the wheelwright expresses it, and which is considered as an error in mechanics, would be less necessary with longer axletrees, and might be formed nearer the true cylinder.

Carts, or vehicles upon one pair of wheels, are preferred in some districts to waggons, which are strongly reprobated. But here, such farmers as have once tried waggons, will not upon any account return to their former method of using carts. Single-horse carts are however used by some gentlemen, in convenient situations,

ations, with perfect satisfaction as to their superior utility.

To moderate the pressure of loaded carts upon the shafting horse, in coming down steep declivities, a locking-pole was invented by Mr. Thomas Colley of Cefn-Gwyddfid in Montgomeryshire; for which the Society for the Encouragement of Arts presented him with a silver medal in the year 1793*.

The original vehicles of corn and hay are still used exclusively in several parts of the uplands; and consist of 1st, *wheeled cars*, having one end sliding on the ground, and the other mounted on a pair of low wheels;—2d, *car-llusg*, or drag-car;—3d, *car-cevn*, or dorsal car; the sliding part, as in the two former vehicles, shod with thick wooden slippers, and a shaft suspended on the horse's back. In hay or corn harvest, it is not uncommon to see half a dozen of these carrying from the same field; one party loading the cars in succession,—a boy mounted on each horse drives full speed,—another party attends at the stack-yard, to receive the loads as they arrive in regular rotation. A stranger will hardly credit the celerity with which a large quantity will be carried, in a short space of time, by this simple method.

To save the trouble or expense of draining boggy meadow grounds in some places, panniers and the brawny shoulders of the natives are employed to carry off the rushy crops of winter fodder; as wheels, or even cars, might prove to be dangerous experiments.

Thrashing Machines.—In the year 1798 there were only two in the six counties; one at Mr. Wilkinson's at Brynbo* in Denbighshire, worked by steam; the other at Mr. Boydell's, of the Manor Farm in Flintshire, turned by water. In the year 1801, the Rev. John Price of Gaer, introduced the third into Montgomeryshire, which was put in motion by three or four horses. These were made upon a cumbersome and expensive construction, amounting to from fourscore to a hundred pounds. In a few years afterwards, the machinery being so much improved and simplified, and consequently the power to work them so much reduced, they are become too common to be enumerated. They are generally of a two-horse power, and cost from 20*l.* to 26*l.*; the farmer finding only the timber delivered on the spot where the mill is to be erected. Hand thrashing-mills have been also introduced; some of them are intended to be conveyed from one farm-yard to another, to thrash by the bushel.

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* For a plate and description—See the Transactions of the Society for the year.

The winnowing machines, called the Carlisle, have for several years been common in the counties of Anglesey, Caernarvon, Denbigh, and Flint; and about the year 1798, they began to find their way into the counties of Montgomery and Meirionydd. In Montgomeryshire, fanners, made of framed wood and canvas, and turned by the hand, were generally used; and the peasants of Meirionydd trusted too much to the assisting operation of fickle Zephyr. The Carlisle machines from Liverpool, &c. brought to Anglesey, cost five guineas; though some artists in that county made them for three guineas. Other machines, upon a more improved construction, have been since introduced,

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* Mr. Pennant, in his Tour, calls this place Bramborough: the common appellation has been here preferred.

duced, and are become common. Their price is from six to eight guineas, according to the quality of the wood, &c. From 75 to 100 bushels of barley may be winnowed in a day by two men, with the assistance of two more when the operation of sacking commences.

CHAP. VI.

ENCLOSING—FENCES—GATES.

IN the infancy of enclosures, fields, as well as farms, were small; and in fencing the outlines, the enclosers would aim at the advantage of taking *in* a bush of quick hedge at the expense of all regularity of shape. Those that still remain within their original bounds, are in general such whimsical figures as would have puzzled Euclid himself to have given them a name. The custom of gavel-kind kept them for centuries in the same size and form: its abolition, and improved husbandry, gave them regularity and expansion.

In the Isle of Anglesey, the Genius of Agriculture mourns for want of shelter and fences. On the shores of the Menai, indeed, timber grows, and quickset hedges flourish: but in more exposed parts, the vast expanse of horizon, without any interruption from woods and hedges, fatigue the observing eye. About the conclusion of the seventeenth century, the Rev. Henry Rowlands, author of *Mona Antiqua Restaurata*, wrote his *Ideæ Agriculturæ;* in which, lamenting the dreariness of his native island, he points out the kinds of woods and shrubs that were not likely to grow, and recommends others that would form lasting fences in the worst soil and keenest air. Although the author, according to the philosophy of the times, frequently bewilders himself in spirits, salts, and sulphur, yet his observations in general bespeak a vigorous intellect. However, his countrymen did not profit either by his example on his own farm, or by his writings. It is but of late that fences, as well as other improvements, have there attracted the attention of the gentleman and the farmer.

The common fences are banks of sods, about four feet and a half high, with a foss on each side: expense of making from 14*d*. to 20*d*. per rood.

About 4000*l*. was expended on the Plas Gwynn estate, in enclosing with stone walls. They measured about 4500 roods, of eight yards each, at 17*s*. per rood. The walls are five feet high, all entirely pointed; and the coping, of one foot depth, worked with mortar.

On Trev-Jorwerth estate are stone fences four feet and a half high, and coped with mortar, at 12*s*. per rood.

On the Pentir estate in Caernarvonshire, several hundred roods of dry walling have been erected; six feet high, three feet thick at the base, tapering to two feet at the top; stones raised, carried, and worked, at from 7*s*. to 9*s*. per rood.

Some miles of stone fences have been erected on Nannau demesne, in Meirionyddshire. They are five feet six inches high under the coping, which projects four inches on each side; three feet thick at the base, and 20 inches at the top: mason's wages 2*s*. 6*d*. per rood. The greater part of the stones were collected, and some of them blasted, in the fields which the walls now enclose.

In places where flattish stones abound, as in the vicinity of schistose mountains, the body of the wall is worked in the common method, one flat layer upon another; then the coping is laid on in the position of slates loaded in a boat or waggon, thus, ||||, and they lock each other effectually; and the fence continues longer in repair than when constructed in any other manner.

Of late, the raising of quickset fences has become prevalent in the Isle of Anglesey, notwithstanding the common prejudice against its practicability. Hedges in the direction of the current of the western winds are found to thrive sufficiently well. On Trev-garnedd farm, the fences in that direction consist chiefly of hawthorn; while it was thought prudent to form the transverse fences which front the storms, with stone.

The manager of Bodavon farm underwent the expense of 5*s*. per rood (which in many other places would cost from 7*s*. to 8*s*.) in forming a quickset fence. By a Montgomeryshire or a Denbighshire farmer, who seldom exceeds the expense of 18*d*. or 2*s*. per rood in quickset fencing, this might be taken for a formidable *chevaux de frize*, erected to check the progress of a horde of Mamelukes. The foss was cut five feet deep, nine feet wide at the top, tapering to 18 inches at the bottom. At the height of one sod from the surface of the foss, a row of hawthorns was planted; above which a bank of sods and earth was raised three feet high; and on the summit of the bank a row of furze seed was sown: and behind the whole a batter was formed of the mould thrown out of the foss.

Some farmers protect their new quick fences with posts and rails; but as the island is so destitute of wood, that practice cannot become general: therefore, temporary mounds of earth are sometimes thrown up on each side the hedges; which, when the sets have grown to maturity, are mixed with lime, and carried off for manure.

Were the Anglesey agriculturists to pursue the following method of growing fences, recommended by Richard Tudor, Esq. of Garth, in Montgomeryshire, they would save the trouble of mounding with earth, and render posts and rails unnecessary.

The lines for the hedges being marked out, the soil, for some yards on each side, should be well prepared by fallowing and manuring. In such an ameliorated soil, one row of hawthorn sets would be sufficient; and those as much as ten or twelve inches asunder; and instead of posts and rails, mounds or ditches, to protect the sets from cattle. The farmer should adopt, where it is practicable, the Norfolk rotation of turnips, barley, clover, wheat, &c. The turnips should all be drawn off, and the clover always cut for soiling horses and cattle, in yards and sheds; and no part of the live stock should at all be permitted to go into those fields during the space of three rotations, which would be twelve years. In the sixth year the sets should be cut within about six inches of the soil; and in another six years they would become an effectual fence. The headlands adjoining the new fences, during the twelve years, should be a perpetual fallow, by hoeing cabbages, turnips, or potatoes; in order that neither weeds nor grass should retard the growth of the hedges. The farmers would find their advantage in pursuing such a system of husbandry, exclusive of the benefit derived from the fences.

The above plan is known to have been adopted in one instance, for four or five years; the farmer then grew tired, and had recourse afterwards to hurdles for the preservation of his young quicks.

A former practice, now discontinued, was to plant the sets inclining in the direction of the fence; and numerous germs were expected to spring from each stem, so as quickly to compose an imperveable barrier.

In removing young hawthorns from the nursery, a frugal method is practised, of chopping them a few inches beneath the surface with a keen spade, the whole length of the drills; so as to leave the tap-roots in the soil. The beds being then raked and dressed, a new succession of hawthorns, without further trouble, will be the immediate consequence. About two years growth of quicks is gained by this operation.

Crabtree seedlings, growing in drills, may be managed in the same manner. Some beds of them being to be transplanted, and their tap-roots too long, were cut off, with a knife, of the length of from four to six inches. These roots lay in heaps upon the surface of the garden for about a fortnight of severe weather in March. The farmer then, for experiment sake, picked the best, and dibbled them in rows parallel to those of the seedlings he had transplanted; and the roots overtook the plants in growth the first year.

These instances account for the speedy reproduction of hawthorns, &c. in woods which had, apparently, been cleared, in being stocked up for fencing: but this reproduction, either from roots or seed, cannot be expected to succeed well, where sheep or cattle are permitted to browse.

Mr. Williams of Pen-y-lan, near Welsh Pool, prior to his planting sets in a poor soil, threw up the mould, made a compost of it with farm-yard dung, and left it, by frequent fallowing, to imbibe the good qualities of the elements for two years: he then formed the bank, and into the fertilized soil dibbled a double row of yearling hawthorns; which are now in a very thriving state. According to the method just recommended for Anglesey, Mr. Williams's* practice is cutting the sets in their sixth year, within a few inches of the soil; by which means the germs become four times more numerous than they would otherwise have been.

The Rev. Simon Lloyd of Bala, in Meirionyddshire, has practised the following mode of fencing with success, especially upon turbary soils. The foss, so contrived as to serve also for a drain, was first marked four feet in breadth, and cut into four rows of sods of equal breadth. The first row was laid, with the sward downwards, within about eighteen inches of the brink of the foss; the second row was placed behind the first; and the third was laid on the first, with the sward also downwards; then the vacancy behind was filled up with mould, so as to be level with the third layer. The bed being thus formed, the quicksets were laid on in an horizontal position, projecting about eight inches over the sods, and having been previously cut about two feet in length. Some mould was laid on their roots, and then the fourth and last row of sods was laid upon them, forming the third front layer. The foss was then cut to the depth of from three to six feet, as soil and circumstances required, and tapered to about 18 inches at the bottom. Lastly, the whole was protected by a temporary fence of posts and rails. By being kept clean from weeds and rubbish for the first three years, such sets as were at first pretty strong and kindly, grew to an effectual fence in three other years. Were the sets laid so as to form an oblique angle with the line of the foss, the shoots growing from them would compose a thicker and stronger fence.

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* If any spot in this district can be said to rival Chinese neatness in agriculture, it must be the little farm managed by this economist. He is the Kliyogg, the rural Socrates of North Wales, and wants but another Hirzel, to render him as celebrated.

Among the rustics there is a prevailing notion, that "some men have an unlucky hand in setting quick," let their skill be ever so great: but farmers need not hesitate to adopt the truth of the maxim, that "the most careful man has the most lucky hand." Some of the most lucky hands are careful in raising the sets with a spade, thereby preserving their tender fibrous roots much better than when they are torn up in the common method with a mattock. Their next care is not to leave them too long exposed to the air; to have the long and crushed roots of the sets trimmed; to get their bed well prepared of fresh mould, clear from rubbish, decayed wood, leaves, &c.; and to press the soil close, so as to become attached to every fibre. Lucky hands also have a discretion neither to bury their sets too deep, nor to plant them too ebb, so as to be starved on the surface of the soil. Too deep planting is a more general mistake than the reverse. In raising varieties of quicksets from the woods, nature gives a lesson to the labourer, shewing how deep they ought to be replanted; that is, the tap-rooted plants ought to be set deeper than those who have only horizontal roots: hence the necessity of setting hawthorns deeper than hazels, &c. &c.

Formerly, farmers were at the yearly expense and trouble of repairing some scores of roods of dead hedges; although the corners, and perhaps the middle of the very fields adjoining abounded with thorns and briars, catching hold of their skirts every time they passed by, and as it were reprimanding the sluggard for not transplanting them. This reflection will bear application to many in the present day; but nevertheless we are gradually improving. There are several hundred roods less of dead hedge within the district, every year.

Hawthorn sets, and furze seed, are imported into Anglesey from Ireland; the former, of two years' growth, at from 3*s*. to 5*s*. per thousand; the latter formerly at 6*d*. per lb., but now advanced to 1*s*., and from that to 2*s*. 6*d*., according to seasons and circumstances.

In the counties of Denbigh, Flint, and Montgomery, hawthorn sets are grown in great quantities by nurserymen; and two-yearlings are sold at various prices, according to distance from market, &c. In Montgomeryshire, near the canal, and large enclosures of wastes, they immediately doubled their former prices. Some gentlemen farmers have nurseries for their own use; and it were desirable that all proprietors of estates should have quickset nurseries, dispersed at regular distances, for the use of their tenantry.

Where verjuice is expressed from crabs, were the core of the refuse preserved and sown in drill beds, millions of quicksets might be easily and cheaply procured; which when plashed, and repeatedly trimmed, would form excellent fences, very little, if any, inferior to those of hawthorn. In a given number of years they will double the growth of hawthorn, they are easier raised, and hardier under every species of management; which are advantages of considerable importance. The only objection urged against them is, that their fruit, when fallen in autumn or winter, tempts pigs to break through fences composed of them. This objection affects only the fences about the buildings; and even there, were the grunting tribe yet possessed with a legion, the prickly-matted sides of this fence, well plashed and trimmed, might bid them defiance.

There is no part of the district where quickset fencing is better understood, or more extensively practised, than in Montgomeryshire. The late large enclosures, in addition to former experience, completed the dexterity of the labourers.

On dry soils, it is thought absurd to raise a mound, and hoist the sets on the summit of an arid bank, where neither permanent moisture nor nourishment can be expected. On the contrary, where two labourers work together, one prepares the bed a spit deep; the other trims the roots of the staggard, and puts it in its place; the first then, by preparing the bed of the second staggard, throws the finer mould to the roots of the first, and the coarser clods as an outside filling, whilst the second labourer presses the mould to the roots with his foot; and so on, till the whole line is planted. Then the sods are cut from the surface of the foss, and placed in an inclining position, at a proper distance from the fence; and finally, the trimmings of the foss are thrown upon the surface of the bank, among the planted staggards. To complete the work, the operation of bearding takes place, with dead trowse, to make the fence impenetrable to the farmer's stock. Bearding was formerly done by laying a line of trowse, especially blackthorn, in an oblique angle to the surface of the bank, and securing that by a row of cloven stakes driven on the outside. Now the expense of bearding is much reduced, both in the quantity and quality of the materials. Cloven stakes are entirely omitted; the toppings of the planted staggards, &c. are stuck on the ditch bank perpendicularly, but inclining so as to become in close contact with the staggards. This latter mode is not so strong or lasting as the other, but appears better to the eye, is more saving of materials, and less tempting to thieving depredators.

On soils too wet, or too ebb upon a substratum of clay or rammel, and upon no other occasion, a mound is raised with a double foss to plant quicksets upon; and in those cases, the mound is frequently formed at the commencement of winter, and the best of the bad mould is thrown into the centre, to be improved by the winter frosts, &c. Then in February, March, or the beginning of April, the sets are planted; digging and pulverising the soil, by the operation as described in the former method of planting a spit deep in sound soils; and leaving a cavity in the middle of the mound, to administer moisture to the quicksets.

In enclosures of wastes it has been a common error, through the avidity of the owner, to plant the quicksets close to the boundary line of the allotment, which is called the *trig*. The foss must then of course be cut close under the roots of the new fence; and for obvious reasons it can never grow well: and if it does, the next time ditching is performed, a neighbour's allotment must be encroached upon to furnish materials. Quicksets therefore should never be planted within less than four feet and a half of the trig.

The season for fencing with quicks extends from October to April. Alder staggards, of all others, require the earliest setting: if they are delayed beyond Christmas, they seldom succeed; excepting in places quite congenial to their growth. The blackthorn is also tender of transplantation. Its spur-heel preserved undamaged is supposed to be necessary: when that is the case, it has been known to succeed when transplanted in full blossom in April.

The most common natural quicks in the lowlands are hazel and hawthorn; variegated with the blackthorn, briar, crab, lesser maple, the spindle tree, and the dogberry;—in a little higher climate, the wild guelder-rose, and the bird-cherry, appear;—then, in the hills, the birch and mountain ash predominate.

Gates,—Properly so called, are framed either of sawed, or of cleft, oak; and are hung to strong posts of the same wood, by means of iron hinges.

The gates about Nannau, and Tan y bwlch, in Meirionyddshire, are made upon a similar plan. The span ten feet clear between the posts;—the top and bottom rails are of oak, and the intermediate ones of foreign deal, all tapering towards the fore-post, in order to lessen the pressure upon the hinges. The catch of the iron latch serves also for a staple, in running through a mortice in the fore-post, whereon a hanging lock may occasionally be fixed.

In Montgomeryshire, the most common of late upon farms are those called Colley gates, from the name of the introducer. The two posts and upper bar only are of spar scantling. The five under bars, and lacers, are of inch boards. It has only one upright lacer, and that in the middle, tenoned into the upper bar. Two diagonal lacers, one from the hinge-heel to within a few hinges of the upright lacer; and the other from the foot of the upright lacer to within a few inches of the top of the fore-post, both parallel, and both tenoned into the upper bar. Then two *shorter* diagonal lacers are nailed; one abutting on the heel of the fore-post, and propping the *long* diagonal upon the fourth rail; the other abutting on the heel of the upright lacer, and propping the other long diagonal likewise on the fourth rail.

These gates fasten spontaneously by means of slip suspended catches; which are found more durable than other detainers, springs, clickers, &c. as the sinking of gates upon their hinges takes no effect upon these.

In the openings into fields in the lowlands, where no common thoroughfare requires gates, morticed posts, and five rails, to be fixed and taken off separately, are common: but being so subject to inconveniences, a hurdle gate has been contrived, of five bars running through three morticed uprights, one at each end, and one in the middle; with the upper and fourth bar projecting about three inches through the posts at each end, to be fitted into common mortices in the post at one end, and into gane mortices in the other, to be lifted up and taken off at pleasure. These are much more convenient and safe than detached rails; and far less expensive than hinged and bulky-posted gates.

In the uplands, a species of gate called *clwyd* is common. It consists of two cleft bars with upright studs, either close enough to keep out pigs, geese, &c. or wider set, and wattled with rods.

Sizes of fields vary according to circumstances, independent of the size of the farm. Wet soils and exposed situations, require smaller enclosures; that ditches may act as drains, and hedges as shelter. In dry soils and warm situations these precautions are unnecessary, and consequently large enclosures are most recommendable. The most approved size of enclosures is one-eighteenth part of the farm; as six acres in a farm of 100; 11 acres in 200; 17 acres in 300; and 22 acres in 400, &c. so as to admit a regular rotation of crops, and appropriate quantities and successions of meadows and pastures.

CHAP. VII.

ARABLE LAND.

SECT. I.—TILLAGE.

THAT farmers convert too much of the lands which were formerly in tillage, into pasture, is but a groundless cause of alarm. Farmers should, and always *will*, consult their own interests: and whether the conversion of their lands into tillage or into pasture be found the most profitable to themselves, the same will eventually be found most beneficial also to the public. Too great a declension of either pasture or tillage, among other causes, may occasion a temporary inconvenience, and partial distress; but it is an inseparable consequence in the nature of things, that an equilibrium will be gradually restored to the agricultural scale, until the other end preponderates in its turn; and so on, in perpetual fluctuation; like the changing of the winds of Heaven from one quarter to another, when the vacuum in the atmosphere has been replenished with air.

The corn raised by tillage in North Wales, in common years, seems not fully equal to its consumption. The deficiency of one part, which is evident from its imports, is not counterbalanced by the superabundance exported from the other part of the district.

Anglesey has frequently been represented as raising great quantities of grain. *Môn-Mam-Gymru*, *i. e.* "Mona the mother of Wales," is an epithet anciently applied to the island by some of her own fond sons; and Giraldus Cambrensis, in the twelfth century, first gave the term the interpretation of "the nursery of Wales," or, according to others, "the nursing mother of Wales;" because it supplied the other Welsh counties with grain in times of scarcity. There may be more fancy than truth in Giraldus's interpretation; for Mr. Rowlands did not think his native island worthy of the appellation, in that light, in the seventeenth century. In his *Ideæ Agriculturæ*, p. 189, he says—"By pinfolding in a well-fenced field in the nights, and at mid-day, during summer and autumn, Anglesey *was formerly* able to send to other counties such quantities of rye, and other corn, and thereby to deserve the venerable title of a *mother*." After enumerating the varieties of manures with which Anglesey abounded, he adds—"Now these were the improvements of this country, as far as I could perceive;—and if, under these only, our lands formerly flourished, *what a slur it must be upon us*, if we suffer it now to sink beneath that esteem:"—a tacit declaration, that Anglesey, in the author's time, did not export much grain.

The great dearth of corn in the year 1795, occasioned a minute inquisition into the produce and imports of the country: at the port of Beaumaris, the account of exports and imports, from the 2d of January, 1793, to the 10th of November, 1795, stood thus:

	Wheat.	Rye.	Barley.	Oats.	Wheat Flour.
	Qrs.	*Qrs.*	*Qrs.*	*Qrs.*	*Qrs.*
Exports, coastwise, within the above period	55	14	263	1876	—
Imports during the same time	592	194	4277	2124	5157
Average of net annual imports during the three years	179	60	1338	$82\frac{2}{3}$	1719

Mr. Lewis Morris, in his Book of Charts, says, that 22,000 bushels of different kinds of grain were shipped off from Holy Head, in Anglesey, in the year 1747; and the anonymous author of the Supplement to Rowlands' *Mona Antiqua*, published in 1774, rates the corn exports of the island, in the year 1770, at 90,000 bushels; whereof the port of Holy Head alone emitted 40,000 bushels.

But these are exports only, no imports are mentioned; which, however, it may be presumed from the several data of calculation, must have taken place. The whole produce of the island, in the year 1795, taken by an actual survey, did not exceed 59,770 quarters, of the following varieties of grain;—oats, 35,485 quarters; barley, 22,700 quarters; wheat, 1578 quarters; rye, 7 quarters.

Rating the acreage of Anglesey at 173,000, and deducting 12,600 acres of waste land; it appears, from the survey of grain in 1795, that no more than an eleventh part of the enclosed lands is under tillage; which may be divided in the following proportions:

	Acres.
Oats	7953
Barley	6107
Wheat	520
Rye	2
Total in tillage	14,582
In meadows and pasture	145,818
Wastes	12,600
Total acreage	173,000

As the county of Caernarvon is not supposed to grow above one half, and the county of Meirionydd not above one-fifth of the produce of Anglesey, their dependence upon other parts for grain, must be proportionally greater.

In the mining part of Flintshire, tillage must naturally be expected in a neglected state; but the fertility of the other part may make up its deficiency, with a surplus; it may therefore be considered as a self-supplying county.

About one-third part of the vales of Denbighshire and Montgomeryshire is under tillage; from which great quantities of grain are annually sold to supply the consuming districts. One house in Liverpool is reported to have paid 55,000*l.* in ten years, for grain exported from the small harbour of Rhuddlan, situate on the outlet of the Clwyd, near St. Asaph.

In the Section on *Oats*, some data are inserted, shewing the increase of wheat culture, and the decrease of that of oats, in a given number of years, within certain parishes in Montgomeryshire. Persons from 70 to 90 years of age, speak with satisfaction of the progress of tillage in general within their recollection. They remember their respective parishes, somewhat hilly, but of sound soils, without a single acre of wheat; where now from five to six hundred acres are annually grown. Before their beginning to use lime as a manure, their teams were composed of oxen; and their wheels of birch-wood, without being bound with iron. In the progress of improvement, the hill farmer took his little cart to meet the higglers half way from the lime-kilns, and returned loaded with a dozen bushels of the far-fetched manure, to be savingly bestowed upon some favourite experiment. Then, by degrees, new roads were formed; additional lime-kilns built; carts gave way for waggons; the half-way higglers sold their ponies, and applied themselves with massy hammers to crumble the stupendous lime-rock, towards supplying the increased demand of improved tillage.

SECT. II.—FALLOWING.

THE Fallowists and Anti-fallowists still persist in maintaining their respective theories. The one party insists that "*fallowing is absolutely necessary;*" the other exults in the idea of "*fallowing exploded:*" but in different soils, and under different circumstances, both parties may be in the right. On such soils as will admit of the culture of the drill and the hoe, fallowing might with reason be deemed a work of supererogation; but on soils of a different description, fallowing seems to be an indispensable operation, and will admit of no substitute, hitherto discovered, for the clearing of weeds. The only means of getting rid of them, is their eradication; and the only means of eradicating them, in such soils, and in difficult seasons, is by making a *complete* fallow. A field well fallowed, without any manure whatever, has been known to produce better crops than another adjoining field, of the same kind of soil, that had been manured, but with inferior tillage. On this the noted Jethro Tull founded his drilling theory.

Dry soils, by various exposures to the influence of the atmosphere, attract its ambrosial dews, and increase their capacity for retention ; and stiff wet soils, by deep, various, and repeated ploughings, become more friable and absorbent. These means of ameliorating soil may be partly attainable in the drill system ; but they must, confessedly, be less efficacious, and more inconvenient. A fallowist has some latitude ; if the weather frown, he may wait until it smiles : but to the driller, soils must be kind, and seasons moderate ; if he let the opportunity pass, it is gone. It may moreover be a point of dispute, whether the value of a drilled green crop, which must be lost by a complete fallow, will not be additionally procured, in the two subsequent years, by superior returns after a fallow. Wherever great crops of wheat, from 15 to 20 returns, have been raised within this district, they were *universally* found, upon inquiry, to have been the produce of complete fallows.

By a fallow must be here understood, land that has been ploughed, for the first time, in autumn, or at latest before the commencement of the winter frosts ;—cross-ploughed in the spring, or as soon as the barley seedness be over ;—then harrowed ; and has had those operations repeated, during the summer months, as frequent as the re-appearance of weeds, and the super-cohesion of the soil, required it.

In what light fallowing was understood, in former times, within this district, may be known from the custom which at present regulates the division of wheat crops between the out-going and the in-coming tenant. If the crop be procured from a stubble, brush, or one-furrow ley, except it be a clover ley of the first year, the out-going tenant has but one-third, and in some townships but one-fourth share: but if it be the product of a *fallow*, and that fallow *ploughed some time before Old Midsummer Day*, then the out-going tenant has one half, and in some places two-thirds, of the crop. This is an abuse that ought to be corrected; as it holds out a premium to knavery and sham tillage. Thereby a farmer defrauds his neighbour of his right, by beginning to fallow his field late in June and the beginning of July; and then permitting the dock and thistles, thus half ploughed in, to flourish in an inclining posture until Michaelmas, when he throws in wheat, to partake with them of the poverty of the soil.

The farmers who fallow in a superior style, plough the first furrow small, both in the depth and the breadth of the plit; so as not, in many instances, to plough above three-fourths of an acre in a day. At the second, or cross furrow, they take plits of larger dimensions, six inches deep, and ten broad; then they use harrows; and the third furrow, where practicable, they plough still deeper, to turn up fresh soil. A flay-plough is sometimes used for the first furrow, with the flayer fastened in a mortice in the beam, about nine inches before the coulter; which is found preferable to Mr. Ducket's method of screwing the flayer to the coulter. Such as neglect to open their fallows until late in the spring, ought to make use of this instrument by all means, if their land will admit of the operation of the flay. Turnips have been sown successfully on the first furrow of ley-ground by the operation of the flay, being manured on the surface with ashes.

There are too many fallowists of another description; who, under a mistaken notion that fallowing is of no other use than giving rest to the soil from bearing *useful* crops, fallow to no other purpose than to procure a more luxuriant crop of weeds: they plough *up* couch-grass, and plough it *in* again; and multiply coltsfoot and thistles by seed as well as by transplantation.

Farmers disagree as to the method of disposing of couch-grasses, and other noxious roots, which they eradicate by fallowing. Some collect them with couch-rakes, and lay them aside in heaps to moulder, and to be made into compost with lime; some burn them on the spot; some leave them to wither and die on the surface; others think they smother them by laying them deep in the ground, under the last furrow, and thereby converting nuisance into manure. In this they may be mistaken, as coltsfoot, rest-harrow, and some other weeds, will grow from a depth that is far beyond the reach of any plough. In a dry barley seedness, when the couch-grasses, especially the *triticum repens*, are well harrowed to the surface, and regularly scattered, many farmers suppose that they encourage the growth of the young barley, and then perish, as it were, by suffocation.

The soils of Anglesey are various. Mr. Rowlands, in his *Ideæ Agriculturæ*, enumerates five kinds*: but in all these varieties, fallowing is not practised but by a few; not even in the strong loam bordering on the Menai. The lighter soils, well adapted to the drill husbandry, are likewise neglected. The ploughs are awkwardly constructed; and the work generally done with them, is but a mere scarification. This applies only to the generality of farmers; it fixes no stigma upon the few spirited improvers within the island, who are otherwise characterized in this Report.

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* See Section on Soil and Surface, p. 25.

Though the Anglesey plough be nearly the same as the old plough used in Denbighshire and Montgomeryshire previous to the introduction of the Lummas; yet the ploughmen in the latter counties seem to have managed it in a superior manner. Old farmers, with the *blodau'r bedd* (the blossoms of the grave, *i. e.* hoary hair) flourishing on their heads, speak in a melancholy tone of the present degeneracy in the produce of crops, since the new ploughs have been universally used. This is not entirely the fancy of querulous decrepitude. Increase of tillage, under the present wide system, does not afford increase of produce in proportion to its extent. The vigour of fresh sound soil must be more productive than worn-out land, though pampered with manure. When the Lummas plough was first introduced, ploughmen vied with each other in the neatness of the surface of their ploughed land. Depth of furrow became entirely neglected. Shallow ploughing is said to be necessary in some of the English counties, in order that the pan of the soil may not be broken. No such precautions were here necessary; though the ruinous practice was inadvertently adopted. Two instances, of indubitable authority, may suffice. A farmer, being an expert manager of the Lummas, always laid his furrows so shallow and neat, as if they had been run over with a groove plane. In a course of years his farm became quite exhausted, though he manured in the common way, and he quitted it. He was succeeded by an inexperienced ploughman, who set his plough and held it at all randoms; but frequently so deep as the beam would permit. Thereby he turned up soil upon which the sun had not shined, nor the air breathed, for many years; and the consequence was, an instantaneous superiority of crops.—2. A farmer having a *cymmorth* (love-ploughing), six teams appeared in the same field, which had undergone the ordeal of shallow ploughing for a long course of years. Five of the ploughs were of the Lummas kind, leaving their work neat and shallow. The sixth was the old long plough, drawn by an ox-team; and the holder, conscious of his inability to rival his comrades in neatness of surface, voluntarily retired to a kind of awkward squad by himself; and by his rough ploughing, which he could not well avoid, he neither satisfied himself nor his employer. However, before harvest, the appearance of the crop declared decidedly in his favour; though the soil, a gravelly loam, seed, and manure, were the same over the field. The boundary line of his ploughing was evident, to an inch, the whole length of the ground. The crop upon his *jugerum* was eight inches taller, and proportionally thicker, than the rest of the field. No account of the difference of produce was kept.

In winter-fallowing, farmers reprobate the idea of ploughing in snow under the furrow: it either starves or poisons the soil. A farmer, in December, making a barley-fallow of a wheat-stubble, had ploughed the whole piece, within about half an acre, upon fair open weather. He was suddenly overtaken by a heavy fall of snow; but he persisted in ploughing, that he might finish the piece; and at last he ploughed in a depth of from three to four inches of snow. Every furrow ran through two kinds of soil, an ebb soil upon clay, and a deep loam. In the spring, barley was sown over the whole field; which, in the progress of its growth, and in produce at harvest, was evidently superior on the part where the snow had been ploughed under the furrow; and that through both kinds of soil, in a straight line from one end of the piece to the other. Whether the snow acted chemically, by nitrating the soil; or mechanically, by protruding the superincumbent furrows to be more thoroughly acted upon by the frosts which followed;—is a question. Its improving both kinds of soil equally, seems to declare in favour of the chemical agent.

But to return from this digression: the greater part of the arable land within the county of Caernarvon, consists of hazel mould, or ferny soil, and various mixtures of sand, shale, gravel, and rammel; such light soils as will not, in the opinion of their respective cultivators, produce wheat; therefore, fallows, as a preparation for that grain, are never attempted by them. The hundred of Lleyn, composing the promontory opposite Bardsey Island, is blessed with a more productive soil; wheat, here, forms a link in the rotation, but very seldom upon a fallow. Mr. Wakeman, landlord of the Hotel Inn at Caernarvon, out of 300 acres of various soils, some clayey and some marly loams, has generally from 20 to 30 acres every summer in fallow. For the credit of spirited farming, this fallowist should leave inn-keeping to some *petit-maitre*, who shines in apish qualifications, and is totally incapable of the employments of Ceres.

In the year 1797, on Bodeugan farm, near St. Asaph, consisting of about 126 acres, there were 35 acres in summer-fallow; the soil clayey, upon a substratum of brownish marl. The occupier also winter-fallowed for oats, to be sown on the third furrow.

The comot of Creuddyn in Caernarvonshire, the Vale of Clwyd in Denbighshire, and the comot of Prestatyn in Flintshire, consist of strong cohesive loams, the best wheat soils within the whole district, and not inferior perhaps to any in Britain. Here, fallowing has its proper and designed effect; it extirpates weeds, and brings the soil to a tilth adapted to receive and nurture the seed. The manures bestowed upon these fallows are, 1. lime in its most caustic state, spread in June, at the rate of from 100 to 120 bushels per acre*, harrowed, and well incorporated with the soil.

2. About the same quantity of lime, made into a compost with treble or quadruple its quantity of headland soil, clearings of ditches, roads, ponds, &c. carted out, and spread before the last furrow: from 50 to 60 loads, or cubic yards, of this compost, to an acre.

3. Farm-yard dung is here generally bestowed on grass lands; sometimes, though seldom, on fallows, at the rate of from 15 to 20 cubic yards per acre, spread, and ploughed in at the last furrow.

4. The same quantity, incorporated with the soil about the beginning of June. This fourth practice has been reprobated, as exposing the oleaginous particles of the manure to be evaporated by solar heat; but if these oleaginous particles of dung be the pabulum of

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* This quantity is to be considered as the general average. In the year 1797, the Dean of St. Asaph bestowed five kilns containing 500 bushels each, and made into compost, upon 15 acres, for wheat. Several others lime profusely.

plants, they do not seem to have evaporated further than the superincumbent soil; for by this kind of manuring, fallows, in the Vale of Clwyd, have produced 20 returns of excellent wheat*. The third is the most common way of applying dung to fallows: but the more enlightened farmers have now left off that practice entirely, as it nurtures weeds, and forces the wheat crop into a length of straw without a proportionate weight of ear. Therefore, they sometimes bestow the dung on the sward at Michaelmas, graze in the spring, lime at Midsummer, and sow wheat on one furrow: or plough upon the dung in autumn as the commencement of a fallow, and make an homogeneous compost of the dung and soil, during the spring and summer, by repeated ploughings, &c. Some farmers, upon good turnip soils, bestow all the four years' manure to that crop; and find the barley, clover, and wheat crops to succeed profitably afterwards, without any further manure: by this method they have less straw and more corn.

In Meirionyddshire fallowing is scarcely known, excepting by a few recent improvers. Common farmers are persuaded, that tenants at will cannot afford such an expensive operation.

In some parts of the Severn and Vyrnwy vales, in

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* In the Kentish Report, the Isle of Shepey is represented as producing the best wheat that comes to the London market, weighing 64 lbs. per Winchester bushel; but if superior weight denote superior quality in wheat, the Vale of Clwyd has the pre-eminence; its wheat, not uncommonly, weighing 68 lbs. per bushel (See Section on Weights and Measures). The peasants of Prestatyn have a current tradition, that not only the Bishops of Bangor, but the Kings of France also were, in former times, supplied with wheat for their own bread-corn from their comot.

Montgomeryshire, where the soils are cohesive, fallowing is practised nearly in the same manner as that already described in the Vale of Clwyd; the common manure being a compost of lime and headland soil, &c.

SECT. III.—ROTATION OF CROPS.

In the eastern coasts of the kingdom, where the soils are more uniform, and the seasons less precarious, than in these western promontories;—the adoption of a systematic rotation of crops must be, in proportion, more feasible. Systems should not put farmers in motion like machines, and make them, as it were, declare war against uncontroulable circumstances and seasons; but farmers should ever vary their systems, when requisite, and render their arrangements subject to the agency of reason.

That some soils require not a rigid adherence to system, may be presumed from the following instance. A farmer, in the Vale of Severn, taking about 100 acres additionally under his cultivation, a great part whereof, being poor soil, and overworked, required "to be put in heart," as he termed it, and to be laid down to recruit under pasture; that he might rise an equal quantity of corn in the interim, found it expedient to bring under tillage some old pasture land, of good soil, that had been pampered with manure on the sward, for a number of years, by his predecessor. The course of crops was the following:—1. wheat on one furrow, no manure;—2. wheat on one furrow, no manure;—3. wheat, on one furrow, top-dressed in March with about 40 bushels per acre of soot;—4. wheat, on one furrow, top-dressed as the third. The soil then beginning to run couchy, a crop of pease effectually smothered the weeds: the brush was ploughed, limed in April, and sown with barley, clover, and ray-grass seeds: 7. pasture for four years: then a rotation of white crops recommenced, without any other crops intervening, save clover once every six or seven years. The fertility of the soil, after 30 years' cropping, seems not to be diminished. The wheat crops were never less than ten returns, and those of other grain in proportion.

In Anglesey, where the quantity of wheat grown to that of oats is but in the proportion of 1 to 22, and to that of barley as 1 to 14; of necessity, the same grain must be successively sown, unless green crops be adopted to intervene.

Impoverishing Rotations.

I.

1. Barley, on a manured fallow, the second or third furrow.
2. Oats for two years.
3. Barley, with a scanty manuring.
4. Oats.
5. Barley, with seeds.

II.

1. Oats on one furrow.
2. Barley on a two-furrowed fallow, with manure.
3. Oats.
4. Oats.
5. Barley, with seeds.

Some rotations, if they deserve the name, are more extravagant even than these.

Rotations of a better Kind.

I.

1. Barley, with manure.
2. Hay, being a mixture of clover and other grasses.
3. Wheat, on the limed sward, one furrow: if the soil be too light, barley.
4. Turnips, manured.
5. Barley, and grass-seeds, for a five or six years' pasture.

II. Near the Menai, and a few other places.

1. Wheat on a fallow, manured; and sometimes on clover-ley, limed.
2. Turnips, manured with sea-tang compost, or turf-ashes.
3. Barley, on one furrow, if the turnips were sown broad-cast, and the soil mellow; on two furrows, if the soil be stronger; or if the drills only had been manured, when a cross-ploughing becomes necessary.
4. Clover and other grasses.

In Caernarvonshire, on light soils, the impoverishing rotations are generally similar to those of Anglesey; and not worth a repetition: oats and barley are the grains chiefly cultivated. Sometimes the same grain is sown for two or three years successively; and the last crop in the course is always accompanied by grass-seeds. The number of farmers who leave their arable ground to recruit by natural grasses, is annually diminishing. It is to be wished the soil were in better tilth, than it is in general, to receive the seed; and that the seeds were better selected, and cleaned, previous to their being sown.

III. In Lleyn, and along the coasts, by the better sort of farmers.

1. Wheat, on a fallow, or clover-ley, limed.
2. Turnips, or other green crops, manured with dung, or composts.
3. Barley.
4. Clover: with an addition of white clover and grass-seeds, if intended for pasture.

IV.

1. Oats on pasture land, one furrow.
2. Turnips, potatoes, &c. manured both with lime and dung.
3. Barley, with 12 lbs. of red clover, and one bushel of clean ray-grass seeds, per acre.
4. Hay.
5. Wheat, previously limed on the sward.
6. A green crop, manured.
7. Barley, with 10 lbs. of red, and 6 lbs. of white, clover.
8. Pasture for a number of years.

V. In Creuddyn, a hundred containing the three parishes of Llandudno, Rhôs, and Llangwstenin, opposite the town of Conway; the soil a cohesive clayey loam.

1. Wheat, on the fourth or fifth furrow of a summer-fallow, manured with lime compost.
2. Barley, on the second or third furrow.
3. Pease, broad-cast, and manured.
4. Wheat on one furrow.
5. Wheat, after a summer-fallow, and manure.

Oats are seldom sown here in the lowlands, and a dry spring makes the soil quite unfit for barley. Rollers, with spikes, or knives, to pulverize the indurated clod, are not sufficiently attended to. An alternate rotation of wheat and beans might answer well in such a soil: but the farmers revolt at the idea, and say they have no market for beans. They have, however, the convenience of sending them in a few hours to Liverpool, Chester, and other places, where the value of beans, as fodder, is well known: and as they grow but very few oats, what better grain can they give to their own horses, and other stock?

V. In a Snowdonian climate, about one-third as high as the Peak.

1. Pasture-ley, manured with well fermented dung at Michaelmas, at the rate of 15 tons per acre.
2. Oats, sown the following spring, and top-dressed with a compound of soot and ashes.
3. Barley, producing 16 returns.
4. Turnips and potatoes.
5. Barley, and grass-seeds for pasture.

In Denbighshire, and Flintshire.

1. Upon light loams, the Norfolk rotation of,

1. Wheat,	3. Barley,
2. Turnips,	4. Clover.

The late Ph. Lloyd Fletcher, Esq. of Gwernhayled, having pursued this system for 18 years without any deviation, found the soil affected in such a manner as not to produce clover as usual: he then laid a thick coating of marl, about 100 cubic yards per acre, on the wheat stubble of the nineteenth crop, in autumn; and left it to pulverize until the latter end of the following summer, when he ploughed it in, and sowed oats thereon in the spring. After this treatment, the soil produced clover, as well as other crops, in abundance.

The complaint is almost general, that in a long course of cropping, wherein clover returns every fourth year, "*the soil becomes wearied with tillage*," according to the farmers' phraseology; and will not produce that chief of artificial grasses, in any degree worth the cultivation: and whenever a crop of clover fails upon land naturally productive, that soil must necessarily be in a very bad state for the succeeding wheat crop. If the farmer persists in dragooning his farm to system, and a second crop of clover fail, it will be high time for him to give cordials and rest to his consumptive patient, and change its treatment until it has recovered its wonted vigour.

Some farmers, to avoid wearying the soil with clover, introduce it but once in two courses, thus—

1. Wheat,
2. Turnips,
3. Barley,
4. Clover,
5. Wheat,
6. Turnips, or vetches,
7. Barley,
8. Pease,
9. Wheat, &c.

Mr. Fletcher took eight crops of potatoes, and eight crops of wheat alternately, from the same piece; always manuring for the potatoe crop; and the latter returns were not found in the least deficient. Some loose soils would have been ruined by this rotation; a crop of wheat even after the second crop of potatoes, would have been a precarious one; unless some methods for consolidating the soil, by folding, &c. previous to the sowing of wheat, and by repeated rollings in the spring, had been adopted. Cohesive soils may be improved by a pulverizing crop alternately with wheat. They are thereby alternately active and passive; their component parts being detached by art, and attaching by nature: whereas the particles of loose soil are, comparatively,

ratively, only an assemblage of inert matter; to be compressed and improved by art and management.

In the Vale of Clwyd, and its Vicinity.

I.

1. Pease, on one furrow, if the soil be moderately light; the sward manured with lime compost, or dung compost: sometimes lime is spread on the pease, when they are five or six inches high: oats on ley, constitutes this first link more frequently than pease.
2. Wheat on one furrow, if the pease crop had cleaned the land; if not, a cross-ploughing is necessary to extirpate the weeds.
3. Turnips, manured; generally broad-cast, sometimes in drills.
4. Barley; if on one furrow, the land is ploughed three weeks or a month before seed-time.
5. Clover, cut for hay; then limed on the aftermath, and grazed.
6. Wheat on one furrow.
7. Barley.
8. Turnips, manured.

II.

1. Turnips, on manured stubble,
2. Barley,
3. Clover,
4. Wheat,
5. Pease, manured,
6. Wheat,
7. Barley.

III. On stronger soils, at Prestatyn, &c.

1. Wheat, on a summer-fallow, manured with lime compost; sometimes, though rarely, with pure lime. Of the quantity per acre, see Section on *Fallowing*.

2. Barley, on the third furrow.
3. Beans or pease, manured.
4. Wheat.
5. Barley.
6. Clover.
7. Wheat; manured with either lime, or farm-yard dung.

On a friable, blackish loam, in Prestatyn, seldom injured by wetness or dryness of weather.

1. Winter vetch in October;
2. Turnips in June; and,
3. Spring wheat, the following March.

Rotation, near St. Asaph, on a thin soil upon clay; natural produce, dwarf furze, brambles, &c.

1. Wheat, drilled upon a summer-fallow.
2. Pease, drilled.
3. Wheat, drilled.
4. Barley, sown broad-cast, with grass and clover-seeds.

In the Hundred of Coleshill, &c. on the Colder Soils, upon Coal.

I.

1. Wheat, on a summer-fallow, manured.
2. Barley, on the second or third furrow.
3. Oats, on one furrow.
4. Oats, on a pin-fallow, and grass-seeds.

II.

1. Oats, on ley, one furrow.
2. Potatoes in part, and fallow in part; both manured.
3. Wheat.
4. Barley, and seeds.
5. Hay.

III.

1. Wheat, on a slight fallow, and manure;
2. Barley;
3. Oats;
4. Clover, and ray-grass;
5. Hay;
6. Pasture.

IV

1. Oats, on ley, one furrow.
2. Beans, if the soil be strong; pease, if light; with manure.
3. Barley.
4. Clover, seldom permitted to seed.
5. Wheat, with manure.

In Bromfield.

I.

1. Pasture-ley, limed on the sward, at the rate of from 100 to 140 bushels per acre; and grazed for the remainder of the year. The lime turned over twice before it be spread, that its causticity may be somewhat diminished.
2. Wheat, the second year, on one furrow.
3. Turnips, manured with farm-yard dung, about 15 tons per acre.
4. Barley. Sometimes Fulham barley after Swedish turnips.

II. On clayey soils.

1. Oats, on one furrow.
2. Wheat, on a limed pin-fallow.
3. Oats, with seeds.
4. Hay.
5. Pasture, limed at Midsummer.
6. Wheat, with a slight covering of dung under the furrow.

III.

III.

1. Pease, on one furrow, manured with headland composts of lime.
2. Wheat, with farm-yard dung spread on the brush.
3. Oats, with seeds.
4. Hay. Too many take two crops of oats, sowing seeds with the latter.

IV. Upon light lands.

1. Turnips, manured with turf-ashes.
2. Barley.
3. Meslin, or a compound of wheat and rye.
4. Turnips, manured with dung.
5. Barley, and seeds.

V. On gravelly light loams, over-tilled, and naturally running weedy.

1. Turnips, on a well-worked fallow; manured with dung, 15 tons per acre; the turnips twice hoed.
2. Barley; with 15 lbs. of red clover, and about three-fourths of a bushel of clean ray-grass seeds per acre. The portion of red clover will of course be less, when hop trefoil and white clover are added, for a permanent pasture.

In Meirionyddshire—Valley of Edernion: Soils Loamy, with more or less Gravel.

1. Oats,
2. Wheat,
3. Barley,
4. Pease,
5. Wheat,
6. Barley, with seeds.

In

In Montgomeryshire, on Good Soils.

I.

1. Turnips, well manured with dung,
2. Barley,
3. Clover,
4. Wheat,
5. Barley,
6. Clover,
7. Wheat,
8. Turnips.

II. In the vales, on strong loamy soils.

1. Oats, or pease, on ley, one furrow.
2. Wheat, upon fallow; manured with lime in summer, and with dung also under the last furrow.
3. Barley, on the third furrow, with clover, and ray-grass.
4. Hay, and the aftermath limed.
5. Wheat, on one furrow.
6. Turnips, manured generally with dung; sometimes with lime alone, but seldom with good effect.
7. Barley, with clover, &c. Sometimes oats, with clover, according to the quality of the soil.

III. On old pasture ground.

1. Oats, on one furrow.
2. Pease, on fallow, manured with either dung or lime; and sometimes sown under furrow.
3. Wheat.
4. Barley, or oats.
5. Clover.

IV.

1. Wheat, on clover-ley, limed.
2. Barley.
3. Pease, manured with composts.
4. Wheat.

5. Barley with clover.
6. Clover, grazed till June 6th, limed immediately, then kept for seed.
7. Wheat.

V. On light gravelly loams.

1. Turnips drilled upon a fallow, and manured with dung. Horse-hoed, first *from*, and then *to* the rows. The better sort carted off, the others fed off on the field.
2. Barley.
3. Clover.
4. Wheat, on one furrow, without manure.
5. Turnips, &c.

VI. A common rotation on a deep hazel mould.

1. Pasture, manured with dung in autumn; grazed from May to July; then limed on the sward, and grazed with sheep until October; then ploughed, and,
2. Wheat, sown on one furrow.
3. Barley, on two or three ploughings.
4. Pease, manured with lime spread on the young plants.
5. Wheat, with a thin coat of dung on the brush.
6. Barley, with clover.
7. Hay. Sometimes the first crop is grazed, and the second kept for seed; then,
8. Wheat, the clover having been limed in June.
9. Barley, as above; and seeds for some years' pasture.

VII. On cold soils, high climate.

1. Oats, on one furrow.
2. Wheat, on a fallow, limed in June, at the rate of from 80 to 100 bushels per acre; or covered with dung

dung before the last furrow, at the rate of about 20 cubic yards per acre.

3. Oats, and sometimes, under favourable circumstances of soil and southern exposure, barley; and either with grass-seeds—clover from 10 to 15lbs. per acre, ray-grass 20 quarts.

VIII. A too common rotation.

1. Oats, on one furrow.
2. Wheat, on a kind of fallow, and limed with about 40 bushels per acre on the second furrow; sometimes manured with dung, at no higher rate than from seven to twelve cubic yards per acre, before the last furrow.
3. Oats.
4. Oats, with seeds.

Too many farmers, in several parts of the district, adhere strictly to the old routine of oats, wheat, barley; oats, wheat, barley; and so on, without any intervening crops, until their soils become nearly too weak to produce even weeds.

The rotations, if they may be so called, in the highland, or mountainous, tracts, are still more repugnant to the theories of the agriculturists of more happy climates. The fields, having no other divisions than low sod fences, and fragments of stone walls, cannot be brought under culture for wheat, or any other winter crop; as they would be entirely devoured by sheep, which have the unlimited range of the whole farm from November until the Lent crops are sown, whe they are cleared out to their mountain walks. In th forlorn part of the creation, the cultivation of no grai except the hardy black oat, is attempted. It is sow successively for three years. The first crop, sown one furrow, and generally without manure, is seldom productive: the second, owing to the soil being brought into better tilth, and manured with some scanty allowance of either dung or lime, yields frequently from five to seven returns: the third produce takes a retrograde turn, giving not above from three to five returns. In general, grass-seeds are then sown; and the ground is depastured for five or six years. Some of the most inconsiderate farmers take a fourth, and even a fifth, crop; but then they have but very little more than their labour for their pains. The hay-seeds are brought from Anglesey into the hilly parts of Denbighshire and Meirionyddshire, for about 15*d.* per bushel; being a mixture of ribwort, darnels, and coarse grasses. These highland farmers have been stigmatized with neglecting to sow any grass-seeds after a course of cropping; but in fact it is seldom the case; and when it is, nature produceth but a scanty crop of ordinary grasses, and weeds.

White oats have been cultivated, upon a small scale, in some of these bleak situations; and where the soil was fresh, and saturated with manure, they have yielded abundant returns. But they will not do to be successively sown; they are more apt to shed their seed on windy weather than the black kind; and their straw is of less value as fodder.

In narrow vallies, more barley is grown on the side having the southern aspect, and more oats on that of the northern. This may be accounted for in the following manner. Most of our main streams run in a direction more or less parallel from north-east to south-west. The hills and dales naturally follow the same course. The narrow vallies, lying between ridges of hills, are generally divided into two more or less equal parts, by a stream of water running along the bottom. The side facing the north is called *cîl haul*, *i. e.* a place forsaken by the sun; and being, in a greater degree than the opposite side, deprived of the genial rays of the bright orb of day, is not its only disadvantage; it has also, almost universally, an ebber soil on a substratum of clay or rammel; which gives it the appearance of being springy, as it retains the wet upon the surface. The southern side of the hills has fewer appearances of springs; and a drier soil, consisting of gravel and hazel mould. This description bespeaks the propriety of growing more oats in the northern, and more barley in the southern aspect. The inhabitants of northern aspects have an adage current among them, that "*The shade never went to the sunshine to borrow oatmeal*[*]."

Oats have been found to stand moderate winters. A farmer having left his crop of white oats too ripe, fallowed the stubble, and harrowed it across, intending to carry lime and sow wheat upon it. A seasonable rain falling, forced up the oats so uniformly over the whole field, that he left it to take its chance. The soil was naturally dry, and the winter not severe. By the following July, he had an excellent crop of oats, ready for the scythe.

SECT. IV.—CROPS COMMONLY CULTIVATED.

If we arrange the varieties of grain according to the scale of quantity they are respectively cultivated, upon an average of the whole district, they will stand in the following order:—1. oats; 2. barley; 3. wheat; 4. rye; reserving pease, beans, vetch, &c. for the next Section.

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[*] "Nid aeth *cîl haul* erioed i *vron haul* i venthycca blawd."

1. *OATS.*

Our original oat, being a very small bearded kind, called *ceirch Teivi*, *ceirch blewog*, and *ceirch coliog*, is now hardly known, save on some few bleak spots of poor soil, where no other grain will grow. It is also, sometimes, sown in the lowlands, mixed with vetch, to be cut green for fodder. For this purpose it excels all other kinds of oats, as its stalks constitute a finer and more juicy herbage; and moreover it does not ripen too early for the vetch, as other species of oats naturally would. It was succeeded by three kinds, black, white, and red; and these were in their turn supplanted, for a time, in some parts, by the Dutch and Polish oats; which answer well in the vales, and upon good soils. They have also been tried in the uplands, for ten or a dozen years; and were found to be earlier about three weeks, which is a material advantage in late climates. But by balancing their disadvantages also, in being too easily shed by blasts of wind, sprouting upon less wet in harvest, than the old kinds; and the straw not affording as good fodder, which is a point of importance in places where great numbers of cattle are reared,—farmers find their interest in returning to cultivate their old grains.

The *red oat*, owing to the compactness of the grain, and being thin-rinded, is reckoned to yield the greatest quantity of meal. On fresh dry soils, it gives ample returns. The white also requires better land than the black kind. The cultivation of the latter, under an idea of its superior hardiness, is more neglected than that of any other grain; being generally thrown into poor, wet, or starved soils; and, consequently, its produce is much less than it ought to be by fair tillage. The white and red sell best, at all seasons, for provender and grinding: at seed time, the black generally takes the lead, owing to a greater demand for it in the market, as about eight-tenths of all the oat lands may be sown with it. It is not so impoverishing a crop as those of the white and red kinds, which require a soil and tilth nearly equal to those for barley. Therefore, when oats are grown successively, none but the black kind ought to be sown: its straw also is by far the best fodder for store cattle.

In a few places on the uplands, a distinct species of oats, called *ceirch cynffon ceiliog*, similar to the Tartarian, is cultivated.

When oats are the first crop in a rotation, they are generally sown on one furrow; but when they terminate the course, the soil receives nearly the same tilth as for barley, that it may be sufficiently pulverized for the grass-seeds. Soil and climate regulate the quantity of seed sown per acre. In high and bleak situations, farmers are persuaded that not above two-thirds of whatever kinds of grain they sow, come to perfection; and accordingly they find it necessary to sow a third part more per acre than their neighbours in the vales upon good soils. Very few farmers sow less than five bushels of red or white oats per acre; of the black, being of less specific gravity, more in bulk is required, sometimes so much as six bushels, or more, per acre. The soil and climate of Anglesey, were tillage properly understood there, stand not in need of such superabundance of seed. Some few farmers save one-third part of the common quantity of oat-seed, by giving the soil superior tillage, and a rolling, before the seed is sown and harrowed in. By this method, 16 returns have been procured, which is nearly quadruple the common produce of the county.

The season of sowing oats is from the beginning of March to the middle of April. When the crop is intended to be cut with scythes, or when grass-seeds are sown with the oats, the field is always rolled, either immediately after sowing, or in May, when the blades are up, and the clods in a middle state between wet and dry. Where the crops are cut with reaping-hooks, rolling is seldom practised, not even when grass-seeds are sown. Some farmers are careful enough to give one weeding to their oat crops. Some eradicate dock and thistles with large pincers which are made for the purpose; others cut them at the surface of the soil with small hooks of the shape of the Arabic figure of seven 7, which they hold in their right hand, and a wooden fork of the same length, in the left hand.

Oats have no other culture while growing; and when harvest comes, in most places in the uplands of Meirionyddshire, they are cut with reaping-hooks, instead of the far preferable, and more expeditious, method, with scythes. All the population of these uplands are reapers; women, children, and all. It is strange that in this reaping district, men of reason in other respects, execrate the idea of adopting scythes: so far is an established, though barbarous, custom, permitted to blind their judgment. Every handful, or gavel, is bound immediately into small sheaves, and four of these sheaves are stuck together, and bound about the top; and in this state the crop is left to season until it be fit for carriage. In dry harvests, this is the most expeditious method of seasoning the grain fit for the barn or the stack; and in wet seasons, when once well put together, it is preserved longer without sprouting, as every occasional blast of wind and sunshine is able to pervade, and dry, such a small body.

In the eastern lowlands, and even in Lleyn, in Caernarvonshire, &c. oats are universally cut with scythes: some use naked scythes, and mow inwards, so that every swath lies close to the standing corn; and is collected out, after every mower, by women or boys, who immediately bind it into small sheaves, in the method just now described as practised in the uplands. Some mow outwards; and the oats are either collected into gavels with rakes, and bound into sheaves, varying in size according to the prospect of weather; or thrown into wind-rows, like barley, and cocked; in which state it lies until seasoned for carriage.

The returns of oats, owing to such difference in the preparation of the soil, are more various than those of any other grain.

In Anglesey, some crops, casually, give ten returns; and sometimes, by superior management, from 15 to 16; although the average produce be not above from four to six. In the year 1796, the occupier of Trevgarnedd farm sowed 27 quarters of oats upon 54 acres, which is not above two bushels of seed per acre; and the produce was 438 quarters, exclusive of rakings; being full 16 returns. In the uplands of the other parts of the district, the average produce of common crops, as is before observed, is not above from three to five returns: in the lowlands from seven to nine.

Although oats have the rank of being cultivated upon a larger scale than any other grain upon an average of the whole district; yet their cultivation has very much diminished of late in the lowlands, and that of other more necessary grains has increased in a double ratio. The proportion of oats to wheat will appear to great advantage by the following account:

	Acres.
Number of acres of wheat, within a certain parish in Montgomeryshire, in the year 1776	466
Acres of oats, in the same year	585
Total acres in oats and wheat in 1776	1051
Total acres in tillage, in the same year	1325
Number of acres of wheat, within the same parish in the year 1797	954
Acres of oats in the same year	448
	1402
Total acreage in tillage in the same year	2416
Within another parish in Montgomeryshire, consisting, by an actual survey, of	3061
There were in wheat in the year 1776	218
In oats in the same year	232
Total in tillage in the same year	571
In pasture, meadow, wastes, roads, &c.	2490
	3061
Within the same parish, in the year 1797:	
In wheat	368
In oats	181
Total in tillage, in the same year	870
In meadow	371
In pasture, woods, and roads	1820
	3061

2. BARLEY.

In Anglesey, the proportion of barley cultivated to the quantity of wheat grown is as 14 to 1: in the vales of Montgomeryshire as 3 to 4. In the former, it is grown chiefly as an article of food; in the latter as an article of luxury; and, consequently, contributes materially to the national revenue.

Farmers, in general, think it very much to their discredit if they buy any kind of corn in market; and consequently grow some of all the varieties of grain, however unfavourable their soils may be to the production of the majority of them. Were one family only to live upon an island, unconnected with any other part of the world, this might be deemed good policy; but in a country where commerce and inland barter have no obstruction, the case is reversed. Farmers upon cold stiff lands, should sell their wheat, and buy barley and malt for the use of their families; and the reverse should be practised upon light soils: their profit by such a management would be much greater than by the present. A rotation adapted to each kind of soil might be adopted; such as buck-wheat, oats, beans, cabbages, rye-grass, &c. with wheat;—and rye, pease, vetch, potatoes, lucern, sainfoin, turnips, clover, &c. with barley.

In Anglesey, and in the light soils of Caernarvonshire, barley frequently commences the rotation; and is sown, from the beginning of April to the beginning of May, on the third furrow of a manured fallow, at the rate of from four to five bushels per acre. When it is a middle link in the rotation upon light soils, it is sometimes carelessly sown on one furrow; but whenever it is to be accompanied by grass-seeds, a more pulverized bed is prepared for it. When it follows wheat, upon soils somewhat cohesive, the stubble is ploughed in November, or as soon as convenient after wheat seedness, harrowed and cross-ploughed in March; harrowed a second time, and rolled, previous to the last furrow in April. On light and dry turnip lands, it is frequently sown on one furrow; the soil ploughed three weeks or a month before seed-time, and slightly harrowed previous to the seed being sown, that it might not be buried too deep. If the turnip land be stronger, or poached by cattle in feeding the crop on the field, a fallowing across the intended ridges is necessary, with harrowing and rolling, previous to the last furrow.

The quantity sown per acre varies, according to soil and climate, from three to five bushels; the most common allowance is 3¼, or three Montgomeryshire strikes of forty quarts each. Some few farmers steep their barley in rain or river water, on dry seasons, and find that it invigorates the germinating principle; but if the soil be not of the arid kind, the seed may be injured by the operation. If the soil be not in a very fine tilth, rolling is necessary after sowing to pulverize it completely. Some, after sowing barley, harrow it in; then sow clover and grass-seeds, and bury them only by a rolling; others make use of a small-tined harrow, and defer the rolling until the barley blades be three or four, and from that to six, inches high, according to the wetness or dryness of the season, and other circumstances.

Barley crops are weeded in the same manner as is already described for oats. In some crops, charlock springs so abundant as to overtop the barley; when it becomes necessary to clip them, when in full blossom, in June or the beginning of July, with scythes. By this means, as this weed is but an annual, it is hindered from seeding, and greatly diminished, if not eradicated from the soil, by repeating the operation.

This grain, like oats, is cut with hooks in the reaping district; with naked scythes in Caernarvonshire, and the eastern lowlands; and with cradled scythes in the Vale of Clwyd, and some other parts. Where the latter weapons are used, the swaths are collected into gavels, with rakes, and bound into small sheaves. This may seem a tedious operation, but it has nevertheless its advantages; there is less shed and trampled, and it preserves the ears better in wet weather. When cut with the naked scythe, in the lowlands, it is always mowed outwards; left in its swath to wither for a few days, then turned; then wind-rowed, and sometimes carried from that state; at other times, according to circumstances, it is left to season more in cocks. For the rate of thrashing barley, &c. by piece-work, see Section on Price of Labour. The one-and-twentieth part of the winnowed corn, whether wheat, barley, or oats, was, in many places, from time immemorial, the customary compensation of the thrasher. The late continual high price of grain put farmers more upon their guard in their thrashing contracts; however, some good old-fashioned people still give out either the twentieth bushel, of 20 quarts striked, or the one-and-twentieth heaped, to the thrasher, with his dinner on the winnowing day; and think it an infamy to act otherwise.

Difference in soils, and management; climate, and aspect; and the towardness, or the reverse, of seasons; make the returns or produce of this grain extremely various. On soils naturally poor, and on some others of a better quality, but in a neglected, worn-out state, some returns are so low as three; and the average from that to five: in the vales, the average may be from seven to ten. Some farmers, on warm barley soils, have had from ten to sixteen returns; and some instances are recorded of twenty. Four bushels of sprat barley, sown after turnips, have produced 84 bushels, near Welsh Pool.

The kinds of barley cultivated are of three sorts;—

1. *Common spring barley;* ear long and narrow; grain close, containing generally from 20 to 32 in each ear. By far the greater quantity sown is of this kind. A supposed variety of it, is here called Wiltshire barley; being thinner rinded and earlier, owing to its having been long cultivated on warm gravelly or chalky soils. Farmers find the advantage of introducing it upon colder soils, when their own seed, in length of time, has degenerated. It has been sown in Montgomeryshire the 24th of June, after turnips, and mown by the latter end of September.

2. *Sprat*, *Putney*, or *Fulham barley*—ear shorter and broader than No. 1; stalk stronger, therefore preferred upon highly manured land, after green crops, as it is less apt to lodge. Not one hundredth part of the barley sown is of this species. It has been sown after a crop of Swedish turnips, near Wrexham, so late as the 7th of June, and was nevertheless cut the 14th of September.

3. *Square*, or *big barley;* sown in the uplands, but not to a great amount. They do not seem to be aware of its hardiness, as it is always sown in the spring, upon their best soils, and those manured. Some writers (the editors of Rees's New Cyclopædia, Middleton in

the Report of Middlesex, &c.) divide this species into two varieties; one having four, and the other six, rows. Two rows, one opposite the other, are distinctly definable; the other two may be considered either as single or double rows, just as the whim affects the observer. The same ear may be called by one person *bear*, or Welsh barley, with four rows; and by another person *big*, or Scotch barley, with six rows. In Scotland they call it also Chester barley.

That the flat-eared barleys require better soils than oats, is generally allowed; but that they are more delicate during severity of weather, seems not to be so well founded.

3. *WHEAT.*

Our original bearded wheat, called *gwenith bychan y wlâd*, was until of late preserved, and grown in small quantities, in some of the hilly parts of the counties of Caernarvon and Meirionydd.

Of wheat, we have but few specific varieties.

1. *Tamworth*, or *red Lammas* wheat, is introduced fresh from ebb soils in England, every fourth or fifth year, by several farmers. The grain at first is as small as rye; and of a bright reddish colour. The first crop gives a good produce, in a well-prepared soil; the grain increases in bulk, and maintains its reddish hue. The second and third years, the grain is of the same size, but of a browner colour, and crops somewhat less. Afterwards it gradually degenerates into the common wheat of the country; and a new succession should be imported. All farmers agree that this is the most profitable kind for seed. Upon good soils, and early in the season, it can hardly be sown too thin the first year; owing to the bushel containing far greater num-

ber of grain, of this wheat, than of other kinds. It generally saves about one-fourth of the customary seed.

2. *Gwenith garw*, or the rough-eared wheat; the straw and ear of a dull white; and the ear nearly as bearded as that of rye. This kind is now nearly grown into disuse. The prickliness of the ear prevents birds preying on it when nearly ripe: it is therefore sometimes sown on headlands, and near hedges.

3. *White Lammas*, is frequently introduced by farmers, who generally make a profit by retailing it, the second year for seed, above the market price; and under new names, according to the counties they procure it from; such as Essex wheat, Devonshire wheat, &c. &c. It gives ample returns the few first years, it then loses its colour, and is discontinued for seed. Upon the whole, it is found, in this district, inferior to the red Lammas, in quality of straw, and several other considerations.

4. *Syrian wheat*, has been tried on a small scale; but given up as an imposition of some quack seedsman. It was found here of less specific gravity than either of the common wheats; being so far inferior to red Lammas as 54 is to 68; though, by dibbling, it has produced 38 returns.

The common wheat of the district is not of any one particular sort; but a mixture of different kinds: and as their respective characteristics do not differ in any material points, they lead to no inconvenience.

Wheat is sown on the third or fourth furrow of a summer-fallow; on the first furrow of clover-ley; on pease, vetch, or buck-wheat brush; and, too frequently, on oat-stubble.

The methods used in preparing this grain for seed, by steeping, &c. will be described in treating of the *Diseases of Wheat.*

In good wheat soils, such as that of Prestatyn, the Vale of Clwyd, &c. the quantity sown per acre, by many farmers, is not above two bushels; but the soil must be in good condition, and the season of sowing early, in September, or the beginning of October. Some are of opinion that an October crop is, in general, preferable to those sown in September, in giving less straw, and greater returns. Those who sow late in October, or the beginning of November, find it necessary to bestow three bushels and one-eighth, or 100 quarts, to the acre. And where bad tillage and bleakness of situation combine, or still later sowings, from three bushels and a half to four bushels per acre, will not be found to produce a lodging crop. Anglesey, in particular, is extravagant in the quantity of seed sown per acre. Were proper tillage to pervade the island, above 80 quarters of seed might be saved every year, from the 520 acres now supposed to be under wheat; without any diminution, but rather increase, of produce. It is true, that in many places so much seed, and more, is sown per acre, as in Anglesey; but they are places far inferior to it in the quality of both soil and climate.

There are three methods of sowing wheat practised within the district:

1. By the *drill.*
2. Sowing *upon* the furrow.
3. Sowing *under* the furrow.

1. John Lloyd, Esq. of Trowscoed, in Montgomeryshire, some years ago, first introduced the drill

husbandry, upon a large scale, into that part of the country; and, according to his own report, pursued it with profit. However, the practice died with him: there are at present but a few gentlemen farmers who are pupils of the Tullian school; and who practise it more by way of amusement than upon any other consideration.

The Rev. G. Howell of Llanymynech, has contrived a small drill for sowing any kind of grain or seed two rows at a time, adapted either for broad intervals upon the Tullian system, or for equidistant rows of any breadth. It is also contrived so as to scuffle and hoe between the rows.

Drilling has been introduced into Meirionyddshire by the Member for the county.

In Denbighshire, and Flintshire, advocates for the drill husbandry are to be met with here and there; but they are to be considered as members of a new sect, and do not gain over many converts; though novelty, in general, has a great power of attraction upon the human mind.

An apology for *drilling* is here inserted, in the words of one of its advocates, extracted from a letter of his to the Writer of this Report.

"*St. Asaph, October* 11, 1806.

* * * * * *

3. *Drill Husbandry.*—"The great obstacle to the drill system seems to arise from the exactness, and supposed additional labour, requisite to prepare the lands. As to the latter, a drill-plough requires only a good fallow, or a well-cleaned bean or pea stubble: and every farmer who hopes, on reasonable grounds, to raise good crops, knows, and admits by his practice,

that so much preparation is necessary for sowing broadcast. And as to exactness, it is owned that on clayey lands the butts must be formed of a certain width and elevation, in order to a fair and accurate sowing. But this trifling difficulty being got over, the drill system, in my opinion, and I write from experience, is entitled to a decided preference. The saving in seed is a material advantage; but above all, the benefit the crops receive from the spring hoeing. The improvements in my crops are so visible after every operation, that the cavils of my prejudiced neighbours are long since put to silence. For a while they objected to the *expense* of hoeing; but upon comparing my subsequent expense of weeding with their own, they are obliged to confess, that even in this respect I am no loser. Another advantage I derive from hoeing the crops in spring, arises from the nature of the soil I have to manage; which is a thin loam, of a very inferior quality, lying on a bed of clay; its natural produce a poor sort of furze, ling, and brambles. In dry summers this sort of land is liable to crack into chasms of different figures, and to different depths; and the corn plants that stand on the margin of these chasms, being deprived of all nourishment, necessarily wither and die. But in the drill system, the soil, being loosened, and thrown up to the plants, by the spring hoeing, is, in the first place, not so liable to crack; or if it does so, it opens where the hoes have ran deepest in the intervals between the rows of corn; so that there being a space of from three inches and a half to four inches from the chasms in the ground to the roots of the plants, they are by no means so liable to be injured.

" From the description I have given you of the soil, you will not expect to hear I have such returns as those you speak of upon the fertile soil of Prestatyn: they are however better than they were when I sowed broad-cast. In that method, wheat seldom exceeded the produce of 15 bushels per acre; and frequently not more than 13: the return now is from 18 to 23 bushels per acre. The difference in barley is greater. In the broad-cast method, I found that grain of so precarious a growth on our soil, and the produce so small, being only from 18 to 24 bushels per acre, and frequently much less,—that I had discontinued sowing it. The two last years I drilled my barley, and had a return of about 37 bushels per acre: nor have I reason to suppose that my crop this year will be less. The reason of this increase of produce on this soil is obvious. Before we are ready to prepare for barley, the land generally becomes so hard, as to be scarcely reducible to a proper state for sowing; after all our ploughing, harrowing, and rolling, it will be still more or less cloddy. In broad-cast, what seed is accidentally covered with well pulverized soil vegetates in four or five days; but a great part of the seed, lodging in crevices between the unreduced clods on the surface, remains exposed to the dry air; and deriving no nourishment from the soil, continues in an inactive state till rain comes, which often does not happen for a fortnight, three weeks, or a month; consequently the crop does not ripen together. On the other hand, the coulters of the drill penetrating through the surface into the more finely pulverized soil, every grain is equally lodged in a proper bed for vegetating; so that they spring together, grow together, and ripen together. I use Cook's drill: those of Macdowal are in the neighbourhood. I sow clovers and grass-seeds with wheat, immediately after the last hoeing, about the beginning of May, and it answers extremely well. Mr. Sedgewick of Greenfield, near Holywell, sows clover with wheat at Michaelmas, which succeeded well.

"I am yours, &c.
"R. T."

2. The method most commonly used, is sowing *upon* the furrow, whether the land be a fallow or a ley. The harrows which bury the seed have been already described. A long-tined pair are drawn by three or more horses, according to circumstances, over the ground twice, or thrice if the soil be obstinate; which are followed by a single-horse pair, until the soil be properly reduced, and the seed covered.

3. Sowing *under* the furrow has been a more common practice than it is at present. The reasons assigned for discontinuing it, were several: 1. The difficulty of getting servants to sow well, unless the ground be previously ridged; which on dry soils would be useless labour; and no advantage to be expected from too high ridges. 2. That the seed might be in danger of having part of it buried too deep by unskilful ploughmen; and that more seed was requisite.

The advocates for *under*-sowing say, that the danger of burying the seed too deep is but imaginary;—that barley, a much less vigorous grain, will bear sowing under the furrow;—that when the field is once prepared, this method is not so liable to obstruction from showery weather as the other, because the labour of harrowing, which requires dry weather, is here unnecessary;—that the plants are better preserved and screened during severe winters, especially upon wet oozy soils;—that the roughness of surface which protects the plants in winter, being pulverized by alternate frosts and thaws, is an additional advantage, and supplies a kind of top-dressing when compressed to the plants by the spring rolling. In fine, they lament that it was ever set aside to adopt an inferior method; especially upon lands well adapted for the under-furrow sowing.

Driving a flock of 100 or 200 sheep repeatedly across light soils, newly sown with wheat, is supposed to have a beneficial effect; and is sometimes practised: it answers the better purposes of rolling, without any of its injurious consequences at that season of the year.

Feeding off a too forward crop of wheat, upon rank soils, fresh cow-pastures, &c. in the spring, is approved of; but over-tilled soils are known to stand in greater need of a top-dressing. Fresh soils, or those highly manured, will bear feeding. Thirty cows, &c. have been seen feeding on a forward piece of wheat, from the middle of March to the beginning of April, the weather dry, without any apparent injury. As the soil was well tilled and manured, this was designed to prevent the crop lodging, by consolidating the surface. Another farmer having sown Essex dun wheat (a variety of white Lammas) on the second furrow of a pea-brush, after clover, and the plants, in the spring, appearing too luxuriant, he grazed the field with mixed stock of sheep, calves, and pigs. The crop however lodged, notwithstanding the precaution. The farmer attributed the lodging to the species of wheat. Though the stalk is apparently stronger than that of the red Lammas; yet it is more hollow, and consequently weaker; and the ear has a greater capacity of retaining wet, which on rainy weather causes a preponderance. Near Llanrhaiadr'Moehnant in Denbighshire, a piece of peaty soil, upon clay, and overrun with rushes, was drained in 1800, ploughed in the following spring, cross-ploughed and harrowed, and the unreduced clods burnt ; then limed, and sown with wheat early in September. By November the whole surface was covered with a matted crop. In the spring 1802, six score sheep, of the small native breed, were turned in, and continued there for six weeks. By that time the field had much the appearance of a fallow. The wheat nevertheless recovered, and the crop was so great as the land could bear. The piece was only five acres. The spring feeding could not be worth less than 9*l*.

Wheat crops of every description, excepting those on strong soils and leys, are rolled in the spring ; sometimes repeatedly.

The operation of weeding has already been described, in the Section on Oats.

The most common instrument for cutting wheat is the reaping-hook. No sickles are used by the natives of the district. Many mow a moderate, fair-standing crop, with cradled scythes ; in the same manner as they do oats or barley. This practice would deservedly become more general, were there not a prevailing idea among the vulgar, that it is expressly forbidden in Scripture ; though no particular text is quoted. They may as well argue that corn should not be thrashed either with a flail or machine ; but that we should adhere to the oriental custom of trampling it out with oxen.

In Lleyn, &c. in Caernarvonshire, the naked scythe is the only instrument used to cut all kinds of grain.

In the lowland vales, thrashing-floors are universally made of oak plank ; in some places with large folding doors on both sides, that they may be used as driving houses in harvest time. Near the argillaceous hills the are made of flag-stones ; in the lime countries, fr

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quently of grout or mortar; and in uplands, where no materials lie convenient, of earth.

The dimensions and number of barn-floors are in proportion to the size of corn farms. Plank floors made hollow underneath, for promoting elasticity, which is considered an advantage in the flail-thrashing, are nevertheless objected to, as the hollows afford a secure retreat for rats and other vermin. Some farmers, to avoid this nuisance, lay the plank close upon a filling of gravel and sand: others, for the sake of preserving the elasticity of the plank, and ensuring a ready access underneath, in convenient situations form the cavity into a pig-stye, &c. But in all situations, were well-burnt bricks used in close quoining the foundation of buildings, instead of loose stones and half-tempered mortar, rats, and other mining vermin, could never enter.

The returns of wheat vary in a sixfold rate: some are so low as three or four, without disappointing the owner. In Anglesey some farmers procure so high as from eight to ten; though the average be not above from four to six. In Creuddyn near Conway, and a tract along the sea coast from thence to Prestatyn in Flintshire, consisting of an excellent wheat soil, the returns are from eight to thirteen; average nine or ten. Mr. Slight, in the year 1791, sowed seven bushels and a half upon four acres and a half of summer-fallow, manured with 731* bushels of lime as caustic as it could be spread; and the produce was 187½ bushels, being 25 returns. The Rev. R. B. Clough has had 18 returns upon a summer-fallow manured with lime compost; though his farm lay a little elevated above the plane of the Vale of Clwyd. Much of the fertile soils of Prestatyn has been under tillage time immemorial, bearing from four to six scourging crops for one that has any tendency to ameliorate; and yet, with the aid of fallowing and manure, they are not apparently exhausted.

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* This, and other such extraordinary limings, are reported merely on the farmers' authority.

Diseases of Wheat—Are of two kinds;—*smut*, and *blight*, or *mildew;* maladies too well known, in their general effects, to need any particular description. They are quite distinct in their nature and causes, though confounded by some writers: and the opinions respecting them are as contradictory as can be expected, upon subjects so much involved in obscurity.

Farmer A says, "I change my wheat-seed frequently, thinking, by that expedient, to prevent the smut."

Farmer B says, "My father made good profit in the wheat seedness every year, by selling his own sound wheat for seed, at an advanced price, and buying smutty grain, at a reduced rate, for his own use; and which he perfectly cured by steeping in a lye made of equal parts of common salt, roch alum, and nitre; and I still follow his example, and my crops escape the smut."

Farmer C says, "I have sown my own wheat for 40 years successively, and never had a smutty crop: and all my precaution to avoid it, was only to sow the seed in its pure, natural state."

Philosopher D says, "the smut-balls are filled with animalculæ; and they must be killed by steeping the infected grain in a strong solution of arsenic."

Philosopher E says, "the poison that will kill the animalculæ, may also injure the vegetative principle in the grain; and that washing it repeatedly in pure water will have the desired effect." To this latter position Mr. Tuke, in his Report of the North Riding of Yorkshire, and others, say—*probatum est.*

Philosopher F asks, "Is the smut a primary diseas in the seed; or is it an incidental one, from which th seedling might have been as clear in the beginning o its growth as a new-born infant must be of the virus o the small pox, or pestilence, which may attack him i his tenth year?" Some plants are infected with th smut, though surrounded by scores of healthy stalks what then can be said? Can any cause of the diseas be attributed to some latent principle in the *soil* or *manure;* and against which no medicament given to th seed can avail? The following observations canno make the subject more intricate than it is at present.

In 1801, the best seed wheat in the London marke being sown in Flintshire, produced smutty grain. Th farmer not having enough to finish his field, sowed hi own diseased grain, without any steeping whatever and, to his surprise, it produced sound grain. Th soil and manure for both apparently the same.

In Montgomeryshire, a farmer having two fields, on that had not been ploughed within memory, the othe commonly under tillage, let them into one piece; manured them equally with lime, and sowed the sam wheat, apparently sound, over the whole. The forme line of the hedge between the two fields, was, by harvest time, the line of demarcation between the disease and the healthy grain. The *fresh* land was smutted; and the old tilled land escaped the infection.

A similar observation occurred in another place; th only difference being, that the *fresh* soil was manure with dung, and the greater part of the arable with lime,

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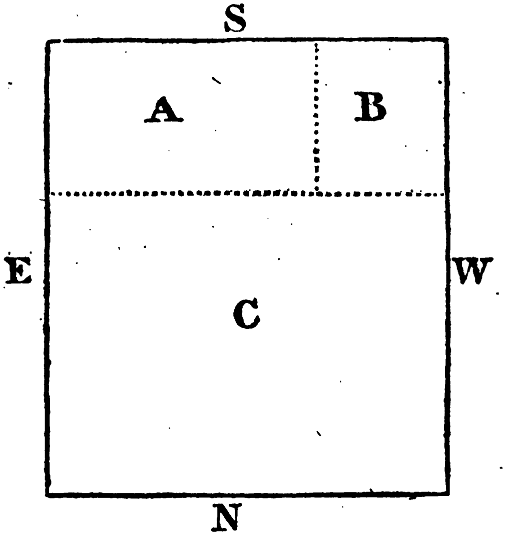
the former was smutted, and the other not. The furrows ran through both, so that there could be no difference in tillage.



The annexed sketch represents several pieces of land now let into one. The plot marked A was part of an old meadow ground, ploughed for the first time for oats, from east to west, the ridges taking in the plot B. The northern plot, C, was sown with pease the same year. At Michaelmas, A and B, the oat stubbles, were manured with dung; C, the pea-brush, was dressed with lime; then the whole piece was ploughed from north to south, and sown with the same seed, the same day. By harvest the plot A only was smutted; and that the exact dimensions of the old meadow ground. Hence, probably, the propriety of beginning a course of tillage upon old leys with turnips, barley, clover, and then wheat. Paring and burning likewise, in particular situations, is not to be despised.

Mr. Crockford, in the Report of Middlesex, p. 535, says, that "the Newbury *peat*-ashes are very apt to *blight* the wheat," when applied as a dressing. He probably means *smut*, and not *mildew*. A piece of *fresh* soil, in Montgomeryshire, ploughed with Ducket's flay, and harrowed sufficiently fine for turnips, was manured with a compost of lime and *peat* earth. Owing to a long drought the turnip-seed never vegetated well, and the piece was sown with *white* Lammas, of a first-rate sample, in October. The crop turned out smutty; whilst the common wheat, in the neighbouring fields, upon old arable land was perfectly clear. As the Newbury peat is supposed to be impregnated with chalk, a compost of common peat-dust and hot lime may have a similar effect as a manure.

The red Lammas is observed not to be so subject to smut as the white. Oats also, and barley, are sometimes affected by this disease. Smutted oats are, by the Welsh, called *ceirch llosg; i. e.* burnt oats.

As the black œdematous dust contained in the smut-balls renders the grain to which it is attached nauseous and unwholesome for food, except it be perfectly washed; the best management of a smutted crop seems to be, if well harvested, to let it lie in the stack or buildings till the following June; by that time, the dust will have become too volatile to attach itself to the grain by thrashing, &c. This has been proved. If the weather in June be moist, keep the corn unthrashed till July.

The most common preparation of seed wheat, within this district, is to sprinkle it with stale urine, and dry it with fine slaked lime; others think the pickle more efficacious by making the urine and lime into a thick grout, so that every grain of the wheat be covered with a coat of the mixture.

The *smut* being a more partial disease in wheat than the *mildew*, which occasionally pervades whole fields and tracts of country, the former may be attributed to some *local* principle, either in the soil, seed, or manure; whilst the latter, from its more widely-extended effect, may be owing to an unseasonable state of the atmosphere at some particular period during the summer months.

The crop of the year 1804 was a lamentable instance of the effect of mildew, in several parts of the island. Mr. Marshall, in his Rural Economy of the West of England, attributes the cause of it, in the country where he had the best opportunity of observing it, to *cold rains*, which fell about the middle of August. The Montgomeryshire Diary, hereinbefore quoted, in the Section on Climate (p. 9), affords a corroborating account of the general wetness of that month; but probably the evil had been effected, or at least had commenced, at an earlier period, in July, when the warm weather was suddenly succeeded by chilling blasts. The time when wheat is in its most succulent or plethoric state, seems to be the season that it is most liable to be affected by unfavourable vicissitudes of the atmosphere. The seasonableness of a hot July was known to our ancestors, which gave rise to the rustic triad—"*Tri pheth a ffynna ar des,—gwenith, a gwenyn, a mes:*" *i. e.* Three things will prosper during a hot summer;—wheat, bees, and acorns.

Sowing early in autumn is recommended as a preventive of the mildew; that the grain may have passed the critical period of taking infection during the shorter nights and the finer weather of June or July. This advice is good, for several reasons; and perhaps for this reason among the rest: however, a problem occurs, not easily solved, so as to favour this hypothesis;—which is this—Is not the mildew more common in southern than in northern climates; and less frequent upon the hills than in the vales? Writers mostly agree to answer in the affirmative. Mr. Young says it is most frequent "on the low, sheltered grounds in the South of England," where grain would be expected to ripen early. Mr. Naismith (Elem. of Agric. p. 263) says he never observed much of it upon the Clyde (in Scotland), except in the year 1802. In Montgomeryshire, in the year 1804, the hilly farms generally escaped the mildew, whilst the grain in the intermixed vallies was, most commonly, more or less infected. Is there, then, an exhalation caused by the influence of the sun upon the soil and its produce, during hot days; which dilates the pores or vessels of the vegetable system *, more than what is naturally necessary; and which, perhaps, are too suddenly closed by succeeding nocturnal colds? This exhalation cannot be expected to take place, so copiously, in hilly situations; and if it did, the air there has a freer course to counteract its effect. Is wheat sown according to the Tullian system, at broad intervals, so subject to mildew as other wheat crops?—If not, free ventilation should be promoted as much as possible in confined, low situations; by plashing overgrown quick fences, by ploughing the ridges for wheat

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* Malphigi discovered in wheat fine net-work, bundles of vesicles and utricles, upright and spiral vessels, and also vessels which he called proper. Dr. Grew observes that the wheat-stalk is strengthened by knots placed at convenient distances. These are the great glands employed in elaborating the appropriated humours, as we may be convinced by chewing them, where we always find a saccharine matter.—*Naismith's Elements*, 161.

in the direction of the most prevailing current of air, &c. &c.

In July 1808, a season nearly as blighty, in some districts, as the former one of 1804, an exhalation was observed in Shropshire, about ten in the evening, after several hot days, skimming the surface of the plain; and visibly attaching itself to the leaves of the wheat and other vegetables, so as to be rubbed off, in a whitish film, by the hand. A few days afterwards, a hue and cry of blighted wheat crops became general through the country. Whether this vapour was the efficient cause of the mildew, or only an unconnected phenomenon, happening at the time, may not be easily decided.

The barberry shrub, like the witches of old, has been frequently condemned, and even executed, upon a supposition of its causing the mildew; but apparently without a fair examination into the nature of causes and their effects. The venom of the fabulous *Bohon-upas* tree of Java, could scarcely be equal to the effects attributed to this apparently harmless shrub. But farmers positively assert that their wheat crops were successively blighted in its vicinity; and upon hearing its deleterious quality, and stocking it up, their crops afterwards were as sound as those of their neighbours. They even trace the extent of its influence, between converging lines, to a certain distance.

If these are facts well ascertained, persons of a different opinion should not hastily contradict them, until all the occult operations of Nature are satisfactorily defined. Who knows what kind of effluvia a current of air may convey from the barberry to the adjoining wheat in full blossom; and what may be the effect?—However, no rational being will pronounce barberry trees equal to the mischief attributed to them. There must be another cause, far more efficient and extensive, when the malady pervades whole counties in an instant of time.

Before closing this subject, one particular observation on the effect of mildew should not be omitted. In the harvest of 1804, in Montgomeryshire, wheat sown on one part of a field was observed to be mildewed; but meslin, or a mixture of wheat and rye, sown on the other part, was perfectly sound; the soil, aspect, manure, and tillage, equally the same for both. This being noticed; caused further enquiry, and every information that was procured corroborated the matter of fact; not only that rye generally escapes the mildew itself, but that it appears also to preserve the wheat sown intermixed with it. That rye, by a hardier texture of its integuments, and lesser irritability of system; or by having its grain better armed against vicissitudes of weather; or by being earlier out of blossom than wheat; or any other cause; should escape the mildew itself, cannot excite wonder; but that it should act as a preventive of mildew in the wheat intermixed with it, deserves further investigation. If cold nights after hot days, or continued cold and wet weather, be productive of mildew; may not the superior tallness of rye serve as a canopy to protect the wheat?

The precaution given by Mr. Young*, to cut the wheat crop as soon as it appears to be mildewed, seems to be founded on reason as well as experience; and merits the attention of every farmer.

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* Farmer's Calendar, p. 416.

4. RYE.

That this grain was formerly cultivated upon a much larger scale than at present, is very obvious. Brown, or common family bread, whether made of wheat alone, or of a mixture of wheat and barley, we still call *bara-rhyg*, or *rye*-bread; and the finer kind of wheaten bread, we call *bara cann-rhyg;* or white *rye*-bread. These terms were very proper when first imposed, when most of our ancestors' fermented bread was made of rye, and their unfermented bread of oatmeal.

On a half-reduced fallow, where the farmer cannot expect a good crop of wheat, he sows meslin or mingled corn, formed by mixing with wheat a portion of rye, at the rate of from one-fourth to one half: this, he says, is by way of guarding against a thin, weedy crop of wheat. Rye will grow where wheat certainly will not; except on lands that have been repeatedly limed, for lime seems to destroy the food of rye in the soil. Were meslin sown on a pared and burned turbary, or any other coarse soil, a grain of rye for every grain of wheat; by harvest time the rye would probably be found to compose full three-fourths of the crop: on old-limed ground, the case would be reversed; and this is one chief reason why the growing of rye has declined in Montgomeryshire, since lime, its natural enemy in that soil, has become the general manure. Rye-straw is more insipid than that of any other grain: cattle will prefer rushes and fern to it. This is another reason of the cultivation of rye being relinquished. When the straw is used as litter, the manure made thereof is but of an inferior quality. The chief usefulness of the straw is for covering stacks of hay and corn;

for this purpose, its great length, and hardness of texture, render it well adapted.

Upon the several hilly manors lately enclosed in Montgomeryshire, consisting of varieties of soils, peat, clay, hazel mould, &c. rye has, almost universally, been the leading crop. The ground being pared and burned, and the ashes spread, the rye is sown under furrow, in three or four-bout ridges, generally in the month of September, or early in October. There is scarcely a soil too poor, or a situation too bleak, to produce a crop of rye, when manured with the ashes of the burnt surface. It seldom has any other manure the first crop. The rye-stubbles, the soil generally light, are not ploughed till the spring, when they are limed, at the provincial rate of from 60 to 70 bushels per acre, for oats. Then the rotation closes or continues, as soil and circumstances dictate; but clover and grass-seeds always accompany the last crop.

The usual quantity sown per acre is about two bushels, and the average produce from 14 to 20 bushels. An acre of fresh soil that would produce 20 bushels of wheat, will give 37 bushels, and upwards, of rye; which on the waste enclosures just mentioned, is not an uncommon return.

In cutting a new road on the side of a steep declivity, in one of the enclosures, the materials dug up, consisting chiefly of shale, mouldering readily in the air, were thrown underneath upon part of a fallow for rye, which was sown, the September following, over the whole piece. The lower part had been treated with lime; the upper, pared and burnt, and on part of it the shale had been spread. In May and June following the crops were very different. The limed crop had a fair appearance; but that which had been covered with shale was so uncommonly luxuriant, as to raise the curiosity of passengers to enquire into the management. It had tillered so abundantly, that 28 perfect stems were numbered on one root. The shaled part had the disadvantage of the other, in being exposed to a higher climate, and in a full northern aspect. Many extensive hills consist entirely of this friable shale; and where it lies contiguous to ramelly clays, and peaty grounds, it might be applied with advantage; especially in the cultivation of rye, and as an ingredient in compost with quicklime, to cover mossy meadow lands.

Where wastes abound, many petty farmers make a rule of paring and burning a few acres thereof, in some convenient spot, and sowing rye thereon; and are commonly repaid with ample returns. But as they throw these enclosures open afterwards, without sowing any kind of grass-seeds thereon, the practice is an injury to the public, and has contributed much to bring paring and burning into disrepute. It is true, that such grounds will not produce any useful herbage for many years afterwards; but the causes are obvious: a complete summer-fallow, left in the same state, would have nearly the same effect. The soil being deprived, by fire, of all its natural grasses, is left bare, and open, either to receive the first seeds blown thither by the wind, or to nurture the first useless germs which may take the advantage of possessing these deserted quillets. These, in general, are Mr. Foxglove and his family, who monopolize the whole, under a lease for years or lives.

There is an account in the Philosophical Transactions, No 130, of a dreadful malady which raged at Sologne in France, among those who lived on rye bread. It is probable that the effect was hastily deduced from a wrong cause; for by long experience we are assured, that rye makes the most wholesome bread of any grain we cultivate, especially to persons of some particular habits of body. Rye bread is recommended to them as a regimen, being cooling and aperient. In summer, when wheaten bread becomes dry and insipid in a few days, a little addition of rye would cause it to retain its softness, without rendering it less palatable, for family use.

There are two varieties of rye, arising chiefly from the nature of the soil and climate in which they have been respectively cultivated:

1. *Rhyg gwyn*—white rye.

2. *Rhyg du*—or dusky rye, grown in the mountains; grain smaller, and meal of inferior quality.

SECT. V.—CROPS NOT COMMONLY CULTIVATED.

1. *PEASE.*

THE quantity grown of these kinds of pulse, in the three western counties, is inconsiderable. In the three eastern counties, their culture is not now so extensive as it has been. About 30 years back, pease occupied, in the vallies of the latter portion of the district, about one-tenth of the land in tillage. The common pease then sown were the russet, partridge, or brown grey, and called by the Welsh *pys brychion*. As a middle link in the rotation, and sometimes upon a ley, they generally preceded a crop of wheat; and were esteemed an excellent preparation; as they were surer of producing a smothering crop than any of the varieties that have succeeded them. The main objection alleged against them was their lateness in ripening, and so preventing the timely sowing of wheat after them. But now, with early spring sowing, and the soils rendered more calcareous by repeated liming, it is presumed that were farmers to give them another trial, they would find it to their advantage. There can scarcely be imagined a better preparation for wheat, to be sown on one furrow, than a clean pea-brush; nor a worse one than that of a weedy crop, which of late years are become so common, that their culture is yearly diminishing. The partridge pease would also suit exceedingly well, as a clean smothering crop, preparative for barley, where a turnip crop is not convenient.

The varieties of pease now generally cultivated are three:

1. *White, or Boiling Pease.*—These supply a good article of provision, in soups, with pork, and on the farmer's table with salted beef also. They require a friable hazel mould, or light loam, containing a due portion of gravel or shale; the mould such as will retain moisture without being too wet; and the quantity of gravel should be such as to attract and retain solar warmth, without injuring the powers of vegetation. In too gravelly soils, crops, after a fair outset in spring, have dwindled entirely away before running into pod. On soils of a reverse nature, good crops may be procured in warm seasons, but they seldom produce what are called free-boilers. Farmers, however, never hesitate in buying these thick-shelled pease for seed, as they immediately change their boiling quality with the quality of the soil. But the trouble of shelling and splitting at the mill, is all that is necessary to make

any pease boil well. In market, boiling pease generally follow, but sometimes double, the price of wheat; and in dear seasons, good crops have yielded 40*l*. per acre.

There are hundreds of acres in the counties of Anglesey, Caernarvon, and Meirionydd, that would, apparently, produce excellent boilers; where the aspect is warm, and the soil well compounded of grateful soil and gravel. Nature having done so much, art should supply manure and tillage. Even in the other three counties, soils of the above description are far more common than farmers are willing to allow. They will shew a few perches, and say, that is the whole upon their farm that will produce good boilers.

2. *Early, or White-eyed Pease*—Commonly called ten-weeks, have been introduced from Shropshire. They are nearly as delicate in their agreement with soils as the real whites; fading as easily in too dry gravel, and as soon chilled in springy soils. They ripen about a fortnight earlier than the black-eyed, which is an important quality when they are to be succeeded by a crop of wheat; for the farmer will have time enough to fallow, if necessary, and manure. In general they give a greater crop also; but they require more seed per acre, owing to their hulm standing more erect, and having less luxuriant foliage. In times of dearth they are boiled, when produced from kind soils, as an esculent with pork and beef.

3. *The Black-eyed, or Clay Pease*—Which supplanted the old russets, or partridge pease, are the sort now most generally cultivated. They are usually sown on barley-stubbles, as a substitute for a crop of clover; and frequently on the first furrow of a pasture. In the latter case, they are necessarily sown *upon* the

furrow: barley or oat stubbles are sometimes fallowed, that the pease may be sown *under* the furrow; which undoubtedly is the best method, especially if the place be frequented by numerous flocks of pigeons. Some farmers manure, either with lime or dung, under the furrow; others spread lime on the surface when the pease are up. The former method is by far the more preferable: scarcity of manure at the sowing season is the only excuse to be given for the latter practice.

The fittest quantity of pease to be sown per acre, in the broad-cast way, is a subject of dispute. Some old farmers say there should be space enough between each plant for a ewe and lamb to lodge; and then they would pod well, and give ample returns. Others disapprove of such scanty sowing, maintaining that if the crop of pease do not entirely cover the soil, it will become full of weeds, especially charlock and sow-thistle; and consequently one main object, the preparing the land for wheat, would be lost. These seeming differences might be reconciled, and both objects obtained, by the drill husbandry. The kind of pea best adapted to that mode of tillage is the ten-week; as it pods well within little compass; and by its stalk standing more erect than that of the common grey, it does not as much impede the operation of the hoe. Dwarfs might also be drilled with advantage.

In the broad-cast husbandry, from two bushels to two bushels and a half per acre are reckoned sufficient, by those who maintain the advantage of a demi-crop: while from three bushels and one-eighth to three bushels and three quarters, are bestowed upon the acre by the other party. When both kinds of crops are just off the fields, and the land ready to be prepared for wheat, a neutral judge would undoubtedly prefer the thick-sowing method, as the soil, after a full crop, appears so clean, mellow, and as it were enriched by some vegetable effluvia, engendered by the smothering crop; repaying tenfold the loss of a few bushels of pease.

Some farmers turn sheep into their broad-cast pea-fields, to nibble the grasses and weeds growing between the young plants, in May or June; but the practice is quite useless, if there be a prospect of a full crop; for it will effectually smother all extra-vegetation: if there be no prospect of a crop, the sooner it is ploughed up the better, either for turnips, or a fallow for wheat.

In dry warm soils, pease may be sown the latter end of February or the beginning of March. In colder situations, early crops may be damaged by spring frosts; it is therefore thought prudent to delay sowing them, under such circumstances, until the beginning of April; and if the soil be manured with dung, they will grow so as to cover the surface before summer drought be strong enough to arrest their progress. If they once spread over the field, there is no danger of its being over-dried: morning and evening dews, or the lightest shower of rain, will generate a kind of nourishing vapour, so as to preserve the mould continually in its fittest state for vegetation.

Fair standing crops of pease are sometimes cut with scythes; but the nearly general method is, for a man to have a reaping-hook in each hand; lifting up the layers of pease, as he walks backwards across the ridges, with the left, and cutting them with the right, hand: this operation is provincially styled *bagging;* and when done by the job, labourers generally charge about 3*s.* 6*d.* per acre. Some cut pease with long-handled bill-hooks. The price of thrashing pease is nearly the same as that of barley.

The most general application of the black and white eyed kinds is to fatten hogs, and are given either whole, steeped, ground into meal, or made into paste. In meal, they are given with turnips, &c. to fatten cattle. Being commonly earlier ripe than wheat and barley, they frequently escape the effect of a wet harvest; and, in that case, their meal is found useful to be mixed, in a small proportion, with that of sprouted bread-corn, making it to bear the fermenting principle much better.

2. *BEANS.*

Only a few acres within the six counties; and the reason alleged by those who till stiff soils, well adapted to their cultivation, is, that they have no market for them; which is not at all admissible from those who have the convenience of water-carriage to send them to distant markets. Swarms of small insects, covering the stalks and leaves, sometimes demolish the whole crop; and if this happens at the first attempt, the farmer gives up further experiment in despair.

3. *VETCHES.*

Not much above two acres in two counties. Sir Robert W. Vaughan, of Nannau, has lately taught the Mervinians how to sow them mixed with *teivi*, or black oats, to be cut green for soiling; which is a practice more or less common in the three counties of Denbigh, Flint, and Montgomery. Winter vetch, as well as rye, are grown by Sir Edward Pryce Lloyd of Pengwern, for spring feeding, to be succeeded in June by turnips.

4. *TURNIPS.*

This valuable vegetable was introduced into the agriculture of Anglesey in the year 1765, by the late Thomas Williams, Esq. of Llan-Nidan. He grew the Norfolk and the Anglesey native kind* in the same field. The former weighed upon an average 10 lbs., the latter 6 lbs. each; but notwithstanding the difference in size, the smaller kind was thought to contain the greater quantity of nutriment, being of a much firmer texture. The imitation of Mr. Williams's culture went on but slowly; it is nevertheless progressive: in the year 1797 there were about 50 acres in the island under turnips, out of which no more than seven were drilled.

About the same time, the Rev. Mr. Newcome, then Vicar of Gresford, introduced turnip culture into Denbighshire, where it has succeeded somewhat better than in Anglesey. Mr. Newcome preferred the Swedish turnip to all other kinds, being much more compact, and therefore better adapted to bear frost and weather. Their specific gravity, in comparison with that of the Norfolk and other common sorts, he found to be in the proportion of 5 to 3, in seed as well as apple. One year, when the common turnips of the neighbourhood were all decayed, and spring feeding for sheep was consequently scarce, he made good rent of his ruta baga, and also accommodated his neighbours, by taking in their sheep at 6*d*. a head per week. Sheep will not taste a Norfolk turnip, as long as a Swedish one remains in the field. A ton of the latter is, by common consent of farmers, allowed to be equal to one ton and a half of the former. Many farmers have however disapproved of the Swedish, without having given them a fair trial. They should be sown at least a month before the other sorts, and then they would be found to apple better. At Nannau, Swedish plants are reared, like those of cabbages, in nurseries; and are afterwards transplanted into the fields: but this plan cannot be expected to succeed well on gravelly soils.

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* It is a small, yellow, garden turnip; and called in Caernarvonshire, "*Maip sîr Vôn.*"

The late Bell Lloyd, Esq. of Bodvach, attempted to introduce turnip culture upon an extensive scale, into the eastern part of Meirionyddshire, on the Crogen estate, about the year 1789. The experiment was made on a piece of eight acres, which by repeated hoeings produced a plentiful crop; and also brought the soil to an excellent condition for a succeeding one of barley. Of this grain three bushels and one-eighth were sown per acre, and the produce astonished the country; 16 bushels being the average produce per acre, but this crop gave about 60. Still, however strange it may appear, the neighbouring farmers, in general, think the culture too expensive to follow the example.

Turnips have been introduced into the western part of Meirionyddshire, by Sir Robert W. Vaughan, of Nannau. His first attempt was on a piece of six acres, not worth above 6*d*. an acre in its natural state, although sportsmen might have valued it at so many pounds, for it was a noted cover for hares, foxes, and such valuable game. The crop of turnips was immense; and saved the owner about 100*l*. the following winter and spring, in hay.

One might suppose that such a return of crop, and such a consequent saving of money, would be sufficient inducement for others to follow the example.

One other circumstance shall be mentioned, as a further stimulant; endeavouring thereby to remove the languor and indolence of mind which stagnates the circulation of improvements.

A certain proprietor in the county of Flint, on succeeding to his estate about 20 years ago, farmed the demesne himself; and, by cultivating turnips, cabbages, &c. largely, became enabled to lett so many acres of meadow land as amounted to 240*l*. a year; and still to keep the same number of stock as his predecessor did, in the old method, upon the whole farm. Notwithstanding such a plain demonstration of profit, his neighbours, in general, saw such farming too expensive.

These complaints of the backwardness of farmers, in general, in adopting the turnip husbandry, was very apposite about the year 1797, when they were first written. Since that time, by the examples of gentlemen upon their own property, and by the encouragement of premiums given by agricultural societies, which are every where instituted with a spirit that does high credit to their several promoters;—farmers are now by degrees becoming less obstinate, and it may be expected that after a few experiments, they will be able to calculate, with satisfaction to themselves, the profits arising from turnip culture.

When field turnips were first grown in Montgomeryshire, about 50 years back, *lime* was the general manure given them; and the crops are reported to have been luxuriant. Then, fresh soils and lime had but just begun their connexion; and the latter met with something in the former which it reduced to the pabulum of plants. Lime, by degrees, having diminished that dormant principle of fertility which it had excited, the turnip crops began to fail; and farmers unwilling to bestow dung upon them, their culture was again relinquished, until within these few years, when the four-bout rotation of turnips, barley, clover, wheat, was adopted by a few; and the farm-yard manure was bestowed upon the turnips, and lime and soil compost upon the wheat crops. However, limed fallows are still frequently sown with turnips, and if they succeed, they are found to bear the winter frosts better than a forced dung crop, and do not run to seed so early in the spring.

Fresh soils, upon the enclosed wastes, pared and burned, with some addition of lime, have produced excellent turnips.

Most farmers spread the dung upon the turnip-fallow, immediately before the last furrow: others prefer giving two ploughings between the manuring and sowing, that the dung and soil may be more intimately incorporated. The general method of sowing, lately, was broad-cast; now drilling becomes more in practice; which is calculated to be an improvement of about half-a-guinea per acre. After the drill, unexperienced hoers are more capable of thinning and weeding the crops. Turnips in drills being more exposed to winter frosts, is urged as an objection. In *wide* drills they may be moulded in autumn by the horse-hoe: in *narrow* drills, which here is the general practice, the leaves, when full grown, spread over the whole intervals between the rows, so as scarcely to be distinguished from a broad-cast crop. Rolling is considered as a necessary operation immediately after sowing, upon light soils and dry weather.

In the year 1800, a great part of June and the whole of July was exceedingly dry. A farmer, in order to insure as much as possible a crop, ploughed his turnip-fallow into two-bout ridges, as if they had been prepared for potatoes. Dung was carted and laid evenly in the hollows; upon the dung the seed was sown by a drill; a furrow was turned by a light plough, along the lines, so as partially to cover the dung and seed; and then to complete the whole, a roller was drawn across the rows. Notwithstanding the dryness of the weather, the plants immediately sprung, and the crop was immense; several bulbs measuring from 28 to 30 inches, and weighing from 18 to 20 lbs.; though the soil was naturally poor, and the climate high. Crops sown in the common way this year generally failed. Another experiment has succeeded upon a dry season. The prepared fallow was first rolled, then dung was spread, late in the evening or early in the morning; upon the dung the Anglesey turnip-seed were sown broad-cast, and ploughed in immediately, like pease or wheat, under the furrow; then the whole field was rolled, to prevent the evaporation of the earth's moisture. A moderate crop appled above ground; and in April, by ploughing for barley, the under-surface bulbs turned up as fresh as the more perishable kinds of turnips at Christmas. The soil for these operations should be what is styled the true turnip soil, and not the strong cohesive kind.

Of the kinds of turnips known in this district, the Tancred, or tankard, is the most perishable. The most perishable are the most porous; and the most porous must evidently contain less nutriment in them than the more solid ones. Their septic qualities may be arranged in the following order: 1. Tancred;—2. Norfolk;—3. Anglesey, or yellow turnip;—4. ruta baga.

5. *POTATOES.*

The British isles have benefited more, in a political view, by the introduction of this truly valuable plant from America, than Spain did by the gold mines of Potosi.

There is no part within this district where potatoes are cultivated so well, and upon so large a scale, as in Anglesey. They are frequently sold there at the low rate of 5*s*. per quarter, heaped measure; which is under 10*d*. the Montgomeryshire strike of 40 quarts. Sometimes they are sold there by weight, to save the trouble of heaping; allowing 74 lbs. to the bushel.

In the year 1797, Mr. Grindley, of Trev-garnedd, had 12 acres of potatoes, and 14 acres of turnips and beans, all in the same field. The potatoes were set in rows, somewhat more than a yard distant. The intervening spaces were fallowed with the plough, as soon as weeds began to appear; and the rows were hand-weeded. The second hoeing was also performed with the plough first; and afterwards the soil was closed to the plants with hand-hoes and spades. The third hoeing was done in the same manner. They were taken up with the plough; first turning off a small furrow from each side of the row, and then running the share right under the bed of potatoes. A number of gatherers followed the plough; and as many as remained were collected by a cross-harrowing. That part of the field was then ploughed, and sown with wheat.

Out of the 12 acres, three were planted with five quarters of pink-eyed potatoes: of these an accurate account was kept. The produce, according to the grower's account, was 150 quarters, heaped measure, exclusive of cullings; and all were immediately shipped for Liverpool.

Caernarvonshire must be ranked next to Anglesey, in neatness of potatoe culture. In the eastern part of Meirionyddshire, both farmers and cottagers pay good attention to the necessary operations of weeding and hoeing. In the western part of the county, especially in the Vale of Ardudwy, potatoes are cultivated in a more negligent manner. The field for potatoes is never ploughed into two-bout ridges, as in other places; but the sets are dropped into every alternate furrow; so that there cannot be above a few inches distance between the rows. After this kind of setting, the next operation is the getting of them up with three-pronged forks and spades. Hoeing and weeding are terms foreign to the farming nomenclature of this tract. The fields, abounding with poppies, persicarias, marygolds, &c. in full blossom, exhibit beautiful mixtures; more grateful to the eye of the florist than the farmer.

The old sorts of potatoes, which were very prolific for years after their first introduction into the country, have now degenerated into a puny race, and do not give above half their wonted returns: an evident proof that they want to be regenerated by seed. The pink-eyed are some of the newest species of field potatoes; and, consequently, are as yet among the best croppers.

By changing the seed, or varying the soil, every year; not cutting the sets too small, and not being too sparing of manure, the curl is supposed to be avoided: the disease being no other than a symptom of degeneracy,

generacy, and which of late years is speedily disappearing.

Instead of the common practice of planting potatoes in some part of a fallow intended for wheat the October following, were farmers to set them in their turnip fields, and as soon as they were taken up in autumn, were the ground ploughed into two-bout ridges, to preserve the soil dry in winter, it would be in excellent preparation for barley in the spring; and would pay better than a crop of wheat, upon soils naturally light.

Manleys, dwarfs, and other varieties of the earlier kinds, are cultivated in gardens; and with little precaution in their management: by treating them somewhat similar to the method described in the Lancashire Report, they become eatably ripe in about two months or nine weeks from the day of setting.

6. *BUCK-WHEAT.*

In 1797 there was only one piece in three counties; and that at Caer-Rhun in Caernarvonshire. In Montgomeryshire, and in parts of the counties of Denbigh and Flint, it was usually sown in May, upon soils well fallowed; and if the crop succeeded, it left the land in excellent order for wheat the following autumn. Its luxuriant foliage, in a full crop, effectually smothers all weeds. When kept for seed, the worst thing is, that in this climate it rarely ripens betimes to permit the farmer to sow his succeeding crop of wheat in season; besides the risk of bad weather in late harvests. Then, if it be sown earlier in the spring, in endeavouring to avoid one evil, we may fall into another: a night's hoar frost would irrecoverably damage this delicate plant. A bushel and a half is deemed sufficient to sow an acre; which sometimes afford 25 returns. Its culture interfering too much with that of turnips in May or June, and its late ripening obstructing the sowing of wheat, have now nearly expunged it from our farming calendar.

To lessen the cohesion and wetness of clayey soils, some farmers turn in their cattle when the buck-wheat is in full bloom; then spread lime upon the tramplings, and plough it *in* immediately. A Montgomeryshire farmer reports an instance of the inefficacy of this vegetable agent in improving poor clays. Upon a piece of this quality, well prepared, he sowed winter vetch, and obtained a full crop. In May it was laid flat with a heavy roller, and ploughed in. Upon this furrow he sowed buck-wheat, which also succeeded; aud in September, when it was in its most succulent state, he treated it in the same manner as he had done the vetch, and ploughed it in. Upon this furrow he sowed wheat, without any further manure than the two green crops. The wheat was followed by oats and clover; but he could not perceive that the soil had been rendered in the least more productive by the treatment; and has not, ever since, repeated the experiment. It is very probable that the piece ought to have been *drained* first, as the indispensable foundation of lasting improvements: then such two full crops of vetch and buck-wheat, ploughed in successively, with the aid of lime in a moderate state of causticity, might have assisted in converting the clay into a more friable mould.

Clover has been sown with buck-wheat, and succeeded well.

7. *HEMP.*

About three acres in the whole county of Caernarvon: in Anglesey and Meirionyddshire probably still less. In the eastern part of Montgomeryshire, there is an hemp-yard attached to almost every cottage. The produce is manufactured into cloth, which is bought by petty drapers for the Cardiganshire markets, at from 18*d.* to 2*s.* 6*d.* per yard.

The crops of hemp are generally scanty, owing to its being sown too much in succession. Potatoes, or beans, are sometimes grown alternately with it. Instead of steeping the hemp in ponds of water, according to the English practice, it is here spread on the grass lands in winter, and left in that state until the woody part of the stalks be so far decayed, as to separate readily from the rind. It is then dried on kilns, and put to undergo the several processes of dressing.

8. *FLAX.*

Government bounties claimed by the growers of this article, as well as of hemp, are likely to be but few within this district. On the best soils of Anglesey, and Lleyn, where great numbers of cattle are reared, flax would pay well for its cultivation; as its seed, made by infusion into a mucilage, mixed with milk, hay-tea, a small portion of salt, and whiting, or some such absorbent, is very useful in the rearing of calves, when they are weaned from their dams; which is a common practice in the eastern part of the district. Whoever intends to grow flax upon a large scale, it would be prudent to procure the first seed, with rules of management, from Ireland. The common practice of sowing flax too thin, is erroneous; by which means it grows branchy, or forked; and produces more seed, it is true, but less lengthy and valuable flax for the manufacture of linen.

At this season of non-intercourse with Russia, the clauses in our random leases, which prohibit the growing of hemp and flax by tenants, ought to be expunged; and instead of fines, frowns, or forfeits, bounties ought to be held out.

CHAP. VIII.

GRASS.

SECT. I.—NATURAL MEADOWS AND PASTURES.

LAND well adapted for tillage, is commonly left too long in pasture; by which neglect it becomes mossy, and in some instances covered with ant-hills. Hidebound land will not vegetate within three weeks of its wonted time. What makes old pastures sacred among farmers is, that although the grass be less in quantity, yet it is supposed to be superior in quality; will fatten cattle sooner; and the milk of kine fed upon it will produce more and better flavoured butter and cheese, than milk procured from recently sown grasses. Meadows well qualified for grazing, may likewise be too repeatedly mown. Farmers, in these instances, seem to forget their own common expression—"*Mae newid gwaith yn gystal a gorphwys*[*]." The adage will bear application to inanimate soils, as well as to animal beings. By change of labour, some pairs of animal muscles getting quiescent, re-collect vigour; while others, by hard exercise, are deprived of it: so by change of tillage, the food of some particular plants may be replenished, while that of others is exhausted in the soil. At least it seems probable, that by a due rotation of crops, and a judicious conversion of pasture into tillage, and *vice versa*, luxuriant vegetation might be rendered more permanent.

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[*] Change of labour is equal to rest.

Hide-bound lands are sometimes quacked up with a scarification; and ant-hills are cut or rounded out in winter, the excrescences pared off, the surface turves preserved whole, and laid aside with their swards downward, and left in that state until late in March, when they are replaced quite level; the ants being supposed to have been killed by frost and rain. But in both these cases, a course of tillage is the only radical cure. In the latter case, and in a coarse deep soil, where furze, &c. are too ready to spring up, *paring* and *burning* would prove an excellent remedy, and is a treatment which the constitution of the soil requires.

The process of scarification, attended with a top-dressing, on meadows not well adapted for tillage, is a very beneficial operation. Mr. Tudor doubled his crops of hay by that means. His scarificator consists of six knives, in the position of coulters in a plough-beam, which have their depths regulated by a wheel.

The natural grasses on the best soils are the same as are generally to be met with in other places of similar climate:—poas;—oat-grasses;—fox, cat, and dogs-tail;—holcuses;—vernal sweet;—marsh bent;—fescues;—cocksfoot;—the three native trefoils, white, red, and yellow, &c. with frequently a great portion of crow-foot *(ranunculus)*.

On inferior and colder soils the scabiosas, bluebottles, centaurea, dyers' broom, daisies, orchises, carexes, &c. occupy considerable portions; and so on as we ascend towards the summits of the hills, the grasses gradually vary, in genera and species to the botanist, as well as in quantity and quality to the farmer. On a tract along the Severn, from Welsh Pool to its source in Pumlumon, or other tracts similarly ascending;—the variations of grasses agreeing with the gradations of climate, are satisfactorily exhibited.

On moist meadow lands, the soil of an inferior quality, a good increase of crops has been procured by sowing tailings of vetch or tares upon the surface, in February, or the beginning of March. The increase might be more certain, were a top-dressing added at the same time. Pliny (lib. xviii. c. 20) recommends beans and vetch to be sown on unploughed lands, as saving tillage without loss of crop: but he wrote in a climate different from ours.

Vicia cracca, tufted vetch; *vicia sylvatica*, wood vetch; *anthyllis vulneraria*, kidney vetch; *vicia sepium*, bush vetch; *lathyrus pratensis*, yellow vetchling[†]; *lotus corniculatus*, birdsfoot trefoil; are all common in wild and neglected grounds; and would probably be well worth the farmer's trouble to introduce them into his pastures and meadows.

Morse, in his American Geography, mentions a perennial wild oat, which he says is equal to rice in quality, and will grow on swampy grounds in cold latitudes: this would be well worth the introduction into North Wales.

Burnet *(poterium sanguisorba)* grows naturally on the limestone hills near Llanidan in Anglesey; and the *sanguisorba officinalis* in Cyrchynan Meadow near St. Asaph, in the Vale of Mold, near Holt on the Dee, and on the banks of the Camlet and the Rhiw in Montgomeryshire, &c.

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[*] These native vetches are called by the Welsh by the general name of *pys llygod*, or mice pease.

The *plantago maritima*, or the sea narrow-leaved plantain, grows naturally on the sea coasts of Anglesey. It tastes like samphire, is very succulent, and sheep are exceedingly fond of it.

SECT. II.—ARTIFICIAL GRASSES.

CLOVER.

OF the trefoils, the white honeysuckle-grass, called white Dutch clover*; the hop, or yellow trefoil; and the red meadow trefoil, or Devonshire cow-grass†; all grow spontaneously in this district, as they do in similar soils in all other parts of the kingdom‡.

Of all cultivated grasses, hitherto introduced, the common *red* clover is the most universally grown, and the most worthy of cultivation. Farmers have sometimes been disappointed in sowing it the second or third year after breaking up of fresh land; as the soil does not seem to be prepared for it sufficiently until it be reduced by a course of tillage. It will then answer expectation for several rotations; until at length it seems to have exhausted its own peculiar nutriment in the soil; which nevertheless, under proper management, retains its wonted fertility in producing other crops. This circumstance points out the necessity of introducing, were it possible, a grass equal to clover in all its characteristics, to be sown as its substitute, alternately, every second or third rotation.

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* *Meillion gwynion.* † *Meillion cochion.*

‡ Their seed, or principia, lie dormant in most soils, and especially in old pastures. A peculiar kind of top-dressing will bring forth one sort of trefoil, while another kind would stimulate a different sort of trefoil to vegetate, on the very same spot of ground; and where neither of them appeared before the application of the manure.

Clover crops failing the second year, upon poor soils, or after improper tillage, need not excite wonder: but of late, farmers are alarmed at their failing the first winter, after once covering the fields, and that upon sound soils, in good tilth. It begins to disappear in patches of a few feet square, in November, or about Christmas, leaving only the withered root in the soil: in the spring, the decayed parts enlarge like an erysipelas, until the crop be not worth preserving. No adequate cause has been hitherto assigned. On digging the soil, no peculiar insects could be discovered about the decayed roots. The winters have not been more severe than common. The Bristol Company probably would recommend gypsum as a restorative.

When the second year's crop of clover fails, the land, under the common rotations, becomes couchy, and is generally fallowed for wheat about Midsummer; sometimes it has one ploughing only for wheat at Michaelmas. One farmer was particularized as an exception to the general rule. He disapproves of sowing wheat upon the failed clover-ley when it is couchy. He manures it well with rotten dung in autumn, and his *ipse dixit* is, that it produces fine herbage the following summer; and, being limed, will be in a superior state for wheat the second autumn, than if it had been sown in its couchy state the preceding year. The soil a light gravelly loam, naturally more liable to produce couch-grasses than soils of greater cohesion.

The quantity of clover sown per acre, varies much, according to the quality of the soil, custom of a particular place, and opinions of individuals, even from 7 to 20 lbs.;—average from 10 to 12 lbs. The prevailing notion is, even of those who sow it as sparingly as a gardener does his carrot-seeds, that it cannot be sown too thick. It is sown, commonly, with barley or oats in the spring; sometimes with wheat, and with buckwheat: and although the sowing of it *alone*, upon poor soils, in August, or in the spring, has been recommended, and, apparently with good reason; yet it has not been known to be practised, save by a farmer near Welsh Pool. He sowed the clover upon a clean crop of pease before they were cut, in August; and when the pease were carried, a light bush-harrow was drawn across. The experiment succeeded according to his expectation; for he secured two years' full crops, which he never before could effect in the common way. Some farmers, upon light soils, give their clovers a rolling in October, or in November, if the weather be dry, to press the mould to the roots of the plants, that it may preserve them from the frost: others, upon such soils, use the roller in the spring. Some graze their first year's clover, or cut it green for soiling or hay; thinking thereby to ensure a better crop the second year. Others cut it for seed the first year, and condemn the second to take its chance; and frequently leave it run to seed two years successively: but those who sow wheat upon the ley of the first year, seem to act the wisest part. By forfeiting one summer's scanty and precarious crop of clover, they lay the foundation of a profitable succession of other crops for three years. The crops of wheat procured after the first year's clover that had been well limed after the first grazing in June, are commonly superior to all others, upon soils somewhat light.

When lands are laid down in pasture after a course of tillage, equal portions of red clover, of white, and of yellow or hop clover, are sometimes sown; in all about 20 lbs. per acre. Some sow 10 lbs. of red, 5 lbs. of white, 5 lbs. of yellow, and a bushel of ray-grass seeds, per acre. But here, 10 lbs. of red clover, which at best is but a biennial, seems to be too great a proportion for pastures intended to be permanent: its proper substitutes are the white clover, and the Devonshire cow-grass, or the red meadow trefoil*. Hay-seeds, containing a great portion of ribwort or the narrow-leaved plantain, are brought from Anglesey into Caernarvonshire, and the upper parts of the counties of Denbigh and Meirionydd, at the rate of about 14*d*. per bushel, to be sown when the lands under tillage are put to rest. In the lower parts of the district, farmers generally buy their hay-seeds from inn-keepers in towns and on the post roads, for about 18*d*. per bushel. But as these latter seeds generally consist of a mixture of all kinds, natural to loamy meadows, in low and moist situations; they are thrown away when sown with the trefoils in gravelly and in dry upland soils. Were the several kinds of seeds divided into proper classes, and sown separately in their respective appropriate soils; pastures would become more universally permanent.

Some farmers always mix their clover with a portion of ray-grass, to act as a corrective of its hoving quality; some prefer clover alone, upon dry soils, taking care not to leave the cattle to graze therein, but only for a dry part of the day: others graze clover at all times with impunity.

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* This excellent trefoil is generally lost in hay grounds, by being so much earlier ripe than any of its accompanying grasses: it therefore suits pastures better than meadows.

The common ray-grass is a perennial; early in spring, and disappearing after the first cutting. The boasted Northleach ray-grass has been introduced, and given up. It produced a reddish aftermath of a coarse quality, that was not relished by any species of stock.

Very little clover is preserved for seed in the three western counties. Mills for shelling ought to be introduced there; and farmers ought to be encouraged to grow seed for the use of their respective districts, by premiums from the agricultural societies. Farmers will be too much inclined to neglect sowing clover, when they are to depend upon the supply of distant markets.

Burnet, *chicory*, *ornithopus perpusillus*, and several other grasses, have been tried by a few experimental farmers; but their curiosity seems to have had no connexion with profit.

Sainfoin has been cultivated, on a shallow limestone soil, by J. Griffith, Esq. of Garn, near Denbigh.

Lucern is grown on about 200 acres of sandy soil in the Sealand enclosures near Flint. When cut green for soiling, an acre has produced five tons, on three crops, during one summer. A ton of hay has been procured per acre, after a very late grazing. The sands required no preparatory tillage, except the harrowing in of the grass-seeds*. Lucern is grown, upon a small scale, in several other places.

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* Of Sealand, and other enclosures, on the estuary of the Dee, see Chap. XI. on *Wastes*.

SECT. III.—HAY HARVEST.

As it has been sarcastically written of the agriculture of Ireland, when in a very low state, that "*half an acre's crop was half a sheaf*[*];" so it has been said of some meadow lands in Wales, that a man may mow in them all day, and carry home his day's math at night. This may appear hyperbolical; but it is so far true, that in some meadows the mark of the swath never disappears; and a mower may be certain of having followed the same line, to a half-inch width, for 20 or any number of years back. In such meadows, the trouble of raking the hay together is the great work of harvest.

As a contrast to the above, we have hay grounds of another description. Gwerneigron mead, near St. Asaph, consisting of 34 acres, is naturally one of the most fertile pieces in the Vale of Clwyd. Being near the farm-yard, it is a turn-out for cattle all winter; and is grazed all spring until about the 12th of May, when it is kept every year for hay, which is generally ready for the scythe by the 12th of July; yielding about two tons per acre. The aftermath is always very luxuriant, consisting of the best grasses; and all this produce without being either watered or manured. In the best meadow grounds of the Vale, six weeks is the common allowance of time between the May grazing and mowing. At Trev-iorwerth in Anglesey, in the year 1798, the crop of three acres, at 50*s*. per ton, sold for 20*l*.; being nearly two tons and three quarters per acre; although the meadow had been mown seven years successively, without being manured.

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[*] Dr. Parnell.

We have two methods of mowing hay; with scythes adapted to each. The upland mower, with his straight-handled, keen-set scythe, and uplifted stroke, could make but little progress in a heavy crop; and the lowland mower, with his crooked-handled scythe, and steady thrust, would be considered as a very indifferent shaver on the rossy moors. The upland mower mows outward; the lowland, inward; and in returning, kicks the swath from the standing hay: but when several mowers follow each other, they must, of course, mow outwards. Both kinds of mowers do very well in their respective situations, but will not do to change places.

In heavy crops, and dry weather, the mode of hay-making is nearly the following; allowing some variations for difference in crops, exposure to sun and air, and intenseness of drought, &c. First day, mowed;—2d, spread or tedded, wind-rowed, and heaped in small cocks in the evening;—3d day, spread again, rowed, and made into middle-sized cocks;—4th day, spread, collected, and carried; or left in large cocks in the field until a better opportunity. The sooner large crops be tedded, the better; otherwise the hay cannot be equally made. It is the opinion of some, that moderate crops are frequently over-done; and, on settled weather, that the hay should rather be left for a time in swaths, that it may imbibe its own effluvia, extracted from its succulence by solar heat, before it be tedded; that the swaths should next be turned like those of barley; and then made into small but high cocks. By such means, the nutriment and flavour of the grasses would be effectually retained *. Scanty crops should be raked together immediately after the scythe; lest the hay, in continuing thinly scattered, should be over-exhausted.

In Anglesey, in August 1797, much hay was out in small heaps of about 1½ cwt. each, much blackened, and some of them nearly buried in the aftermath. Great allowance should be made on account of the wetness of that season. In good harvests, the farmers in that island are too much inclined to leave their hay scattered in the meadows, until, by alternate heat and moisture, it be deprived of all its salubrity and nutritive power. Their plea is, that *their* hay will not admit of being carried so early as that in inland counties, owing to its being impregnated with marine salt, which must be bleached out by the weather, to prevent their stacks catching fire. This idea is very repugnant to that entertained by some farmers in other counties, who strew their stacks in making, copiously, with salt; and think they find advantage by the practice. It is true, that sea-water is not so easily dried from any substance as fresh water; but that rain-water in the vicinity of the sea, contains such a saline quality as to retard the progress of hay-making more than any other rain, can hardly be credited. At all events, the Anglesey farmer would better run the risk of setting a few stacks on fire, than persevere in depriving his hay of its natural juices.

Several contrivances are made use of to prevent green hay heating, or bad harvested hay moulding, in stacks, &c. Some place layers of brushwood faggots at the depth of every five or six feet, which cause a regular ventilation through the whole. Others form funnels by drawing sacks or wisps of straw, as the stack is in making, from the bottom to the top. In the Vale of Severn, wooden funnel-frames are formed of four slender ladder-poles, joined together by three or four pegs or staves on each side, so as to be about two feet width at the bottom, and about one foot at the top. These funnels are fixed in the ground, at the regular distance of nine or ten feet from each other; some stacks having two, some three, according to their length. When the hay is carried off, the funnels are left standing for the use of the following year. A question occurs, whether these funnels can be of any use, either in improving hay harvested in rainy weather, or in preserving hay too hastily collected, unless they have a free thoroughfare for the air underneath?—and even then, when the hay has been put together too green, so as to undergo a violent fermentation; whether these funnels are calculated to allay the heat, or to act as so many bellows, to hasten the ignition? But in hay damaged by wet weather, and stacked hastily, such contrivances to admit *a currency of air*, are of acknowledged utility.

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* This is but closet philosophy, and will have no other effect than exercising the risible muscles of the practical farmer.

The hay harvest of 1807 being rainy, a farmer formed the foundation of his stack with sizeable loose stones, so as to have open pipes from the cardinal points to the centres, over which funnels were made by means of sacks filled with straw. This had the desired effect. The hay, in April, was well preserved, and better coloured than could be expected from the state it was in when put together. The hay from the same ground in 1808 did not meet with much better weather; and the farmer ordered his men to funnel as the preceding year, the pipes being already in repair; but the men, under a supposition that the hay was better harvested than that of the preceding year, disobeyed the command, and the hay turned out exceedingly mouldy. Tops of trees, or cordwood, might serve for temporary purposes; but where much hay is annually stacked, permanent staddles would well repay the expense of making.

Spare straw is frequently used in making stacks, with half-made or succulent hay, in alternate layers about six inches deep. The straw improves by imbibing the fermenting juices of the green hay; and the hay retains its colour, owing to the absorbent quality of the straw. This mixed fodder is intended for store cattle.

In precarious harvests, Dutch barns, or helms, as they are provincially called, are found very convenient to secure any quantity of hay, or corn, that may be dry enough to be carried. On Nannau demesne, in Meirionyddshire, and other places, they are erected at convenient distances in different parts of the farm. Some for corn, rest on ten or more capped pedestals of wood, or stone; in order to avoid the depredations of vermin. Being more airy than confined barns, they are said to preserve both corn and hay better. They are made of various shapes and dimensions; some square, five yards to a side, which will admit of about eight tons of hay; others oblong, nine yards by seven, and six, high, which will contain about 20 tons: estimate, according to dimensions and materials, from 50*s.* to 7*l.* The roofs slide up and down vertically, that their height may be adjusted to any quantity put or left under them; and are supported by iron pins running through the posts.

Time of hay harvest is, generally, from the latter end of June to the beginning of August.

SECT. IV.—FEEDING.

THE produce of our meadows and pastures is consumed by the several kinds of domestic animals, which are to be described in the Chapter on *Live Stock*. In the eastern parts of the counties of Denbigh, Flint, and Montgomery, consisting of the most fertile vales, the principal object of the farmers is to convert their hay and grass, as much as possible, into butter and cheese; which they send off in large quantities to Chester, Shrewsbury, and Bridgnorth *.

In the hilly parts of the afore-named counties, and in Anglesey, Caernarvon, and Meirionydd, their peculiar province is to rear cattle, to be sold lean to the graziers of other districts, more favoured with richness of pasture, and where there is a greater consumption of animal food.

In proportion to the whole extent, we have but few acres of land that will fatten cattle: the vales of the Severn and Vyrnwy in Montgomeryshire, the banks of the Dee in Flintshire, and the Vale of Clwyd in Denbighshire, are the principal places where the pastures afford sufficient nutriment for that purpose.

A piece of 96 acres, upon the Severn, will take in, the 1st of May, about 50 head of lean beasts; which by degrees may be increased to 80; and by the beginning of August, some of the better sort will be saleable for the Shrewsbury or other markets; others not until the beginning of September, and some still later, according to their condition when taken in, and their comparative capacity of getting fat. What are not killed in autumn, are improved with turnips, hay, and corn, for the winter and the following spring.

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* Since the Montgomeryshire Canal has been made, Welsh Pool might be a very convenient mart for the butter and cheese of the county, and its neighbourhood. There is no reason why the makers of those articles should take them so far as Bridgnorth, or Shrewsbury, to meet the consumers.

CHAP. IX.

GARDENS AND ORCHARDS.

THE gardens of the opulent exhibit elegance; and in the production of fruit, the untowardness of climate is rendered more genial by artificial heat, in the same manner as in other parts of the kingdom. The gardens of the farmers supply their tables with plenty of esculent vegetables. Too many poor cottagers have not as much as a *leek* or a potatoe, except what they either beg or buy: this reflection is more peculiarly applicable to the counties of Caernarvon and Meirionydd.

It is a duty virtually incumbent on parish officers, to see their respective poor accommodated, where feasible, with a spot of ground sufficient to raise the most necessary vegetables, adequate to the consumption of their families; and to instruct them in the moral of a well-known adage, that—"Famine never enters the house through the garden door*."

In the greater part of the district, the planting of orchards would be thought a very wrong application of the soil. There, applying the sarcasm of a certain French writer †, "they have no ripe fruit but roasted apples;" to which may be added the berries of the

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* See the Section on *Provisions*, Chap. XIV.

† M. De Lauraguais.

mountain ash. On the borders of England are some orchards; and in plentiful years, a few farmers make either cider or perry for their own beverage.

The failure of raising orchards may be owing, in a great measure, to the attempt of introducing fruit too delicate for the climate: apples of a hardier kind, with the aid of well-contrived plantations for shelter, and the improvement of the soil by tillage and manure, might ensure better success. Nocturnal fumigations during spring frosts, might also have good effect.

Sea-kale, the *crambe maritima* of Linnæus, growing on the sea-coasts of Anglesey and Caernarvonshire, especially from Penmaen Mawr to Bangor, along the Menai, and from thence to Nevin and Aberdaron; has in some places been introduced into gardens; and is found an excellent succedaneum for asparagus, being somewhat earlier in the spring.

CHAP. X.

WOODS AND PLANTATIONS.

1. *Anglesey.*

WE have the testimony of tradition, as well as hints from history, that several places which are now destitute of woods, were in former times entire forests. They were planted by the hand of *Nature*, which seems to have had some better method of raising trees, than that practised in our days by her humble imitatrix, *Art*. To cover the sides of our Snowdonian Alps with woods, would at present be deemed more than a Sisyphean labour; but it is certain they were once covered[*]. "*Pan dorrir y deri, ar ochr Eryri*[†]," is in every shepherd's mouth on those mountains; and proves that, when the lines were written, some of the heights of Snowdon were forests of oak; some of the stumps of which are still to be seen, in elevated situations[‡].

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[*] The neighbourhood of Capel Curig, Llanberis, and Glyn Llugwy, in the time of Leland, was covered with the best wood of the county: there appear at present but few recent plantations, and small underwood. Of the innumerable thousands of cedars which formerly decorated the heights of Lebanon, there were only four or five, worth notice, when Volney visited the place in the year 1784.—*Travels through Syria and Egypt*, vol. i. 292.

[†] *i. e.* "When the oak trees shall be cut down on the declivities of Snowdon"—such an event will happen.

[‡] A fir tree, four feet in diameter, was found three feet deep in a turbary, at Dolwyddelan, in the year 1786.

Anglesey is said to have formerly supplied the King of *Man* with timber[*], and to have had the epithet of the *dark* or *shady* island[†], in allusion to its thick groves of wood: but were the island inhabited at present by *pagan* Druids, the sages would be at some difficulty to find a sufficient number of oak to bear the sacred miseltoe. They would indeed be confined to a narrow slip of land along the Menai, extending from Baron Hill, the seat of Lord Bulkeley, to Llanidan, the occasional residence of Mr. Williams.

Many of the islanders are prepossessed with the opinion, that trees will not thrive in such situations. They certainly will not, except they be planted on a large scale, and protected from the depredations of sheep and cattle. Sea air, however salubrious it may be to animals, is evidently very inimical to the growth of wood; and the western and south-western winds more so than any other. From them, most of the exposed trees in the island bend their tops, more or less; some even approaching to a right angle, and as it were endeavouring, by vegetable instinct, to escape their venomous breath. Near Dulas Bay, some trees may be observed fully exposed to the north sea-air; yet they all incline to meet it, rather than endure the more violent blasts of the south-west; although the latter must have blown over 15 miles of land; that is, all the breadth of the island from Aberffraw to Dulas.

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[*] Sir John Price, in his Description of Wales.

[†] "*Ynys dywell.*"

" ———————————— These groves
" Have caught the dismal colouring of my soul,
" Changing their dark dun garbs to very sable:
" ——————————— Hail, hallowed oaks!
" Ye wave your bold heads 'mid the liberal air."

Mason, in Caractacus.

A cause has been assigned for the wind from the west and the south-west, being more noxious to dendro-vegetation than from any other quarter; which is, its traversing the vast Atlantic Ocean; and by the time it has reached Anglesey, it is supposed almost saturated with sea-salt, which it contains in solution, and is sometimes found, according to the author of *Ideæ Agriculturæ*, deposited, and crystallized, on the leaves and barks of trees *. This may be the case after violent showers; but then the salt may be said to be deposited rather by water than air. The northern winds, they further observe, having narrower seas to cross, and also by their coldness a less capacity for the solution and retention of marine salt, cannot have so malignant an effect. But this difference may be owing to the attacks of the western winds being more frequent, and, by much, more furious than any other winds, rather than to their saline quality. The effect, however, is obvious; though the cause may be a problem yet to be solved.

Notwithstanding these supposed natural obstacles, there are, even in bleak situations in Anglesey, instances of young plantations promising well.

At Bodavon, the Rev. Richard Williams has a plantation of about 40 years' growth, consisting chiefly of Scotch pines, some elm, ash, and sycamore. Some of the fir are three feet and a half in circumference, at the height of four feet; the other kinds are much smaller, but all thriving, except a few to the west. Here also, single trees in hedge-rows, &c. all bend, even to an angle, towards the north-east.

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* Will green leaves, &c. of trees, in these marine exposures, on combustion, yield soda, and not potash?

At Trev-Jorwerth are some plantations, well protected and flourishing; although they are situate on a rising ground facing the west, and the sea only six miles off. On the western extremities of the plantations, some of the Scotch-pine centinels have fallen victims to the preservation of the rest; which are, as it were in a garrison, besieged by the occidental winds. Several others in the outer ranks begin to lose their verdure, and to assume a sandy complexion: but those in the interior, do not manifest any symptoms of distress.

Were plantations grown on a large scale on the western coasts of Anglesey, quickset fences would soon flourish under their protection; and both would administer their joint benign influence to the sheltered fields of corn and pasture. The island would then surpass in beauty even Tempé itself; it could hardly be rivalled by the most delightful spot in Britain. Great numbers of acres should be planted with the hardiest kinds of trees, in a compact body. The most proper shapes for plantations would be parallelograms, with their shorter sides to the west; by which means, the greater number would be protected with the loss of a few. The plane, black and abele poplar, sycamore*, larch and hop willow, owing to the rapidity of their growth; mountain ash, and birch, from their being thriving natives of exposed situations; and most evergreens, seem to be the hardiest, and consequently the best calculated to protect the interior of plantations.

The influence of such a western range of plantations could not be expected to extend but to a certain distance; where another parallel range should be judiciously planted; and so on, until the whole island be well sheltered.—"*Ond pwy fydd byw, pan wnelo Duw hyn?*" Num. xxiv. 23.

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* *Sycamore.* This term is vulgarly and improperly applied to the *acer majus*, or great maple—Wallicè, *masarn.*

2. *Caernarvonshire.*

Except some few recent plantations near gentlemen's seats, the whole promontory of Lleyn and Evionydd, in this county, is as destitute of woods as the most dreary part of Anglesey. About Llanystymdwy, Gwynvryn, and Plâs Hên, the surface of the country has some few woods to cover its nakedness. At the latter place, the property of Sir Thomas Mostyn, Bart. about one-third of the young trees should be cut, that the remainder may have space to grow. To the west of the house, the oak trees, by not having been preserved from cattle, and being also exposed to sea-air, are so stinted in their growth, as not to exceed six inches in diameter, although about 60 years old: therefore they should all be cut level with the surface, except a belt about 100 yards wide on the western side, to shelter the germs which would spring from the stocks; and then, by fencing up from all injury, a succession of more valuable timber would be the result. At least, this method merits an experiment*.

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* Mr. Arthur Young, in his Irish Tour, condemns this practice; saying, that it is no other than "cutting down *timber* to raise *copse-wood*:" but here, it is to be presumed, the case would be reversed. That good timber trees have grown upon old stumps, is unquestionable. *See Evelyn's Sylva, first edition*, p. 45. At Millichap, near Ludlow, some years ago, there were oak trees of that kind of growth, measuring 100 cubic feet each. The Writer of this Report has measured such oaks 84 inches in circumference, at the height of five feet; which, in all probability, would

Creuddyn, a hundred detached from the body of the county by the river Conway, is well wooded about Marl, Bodyscallen, and Gloddaith. In Marl Wood are some Scotch pine, about 60 feet long, and 6½ feet in circumference, at the height of four feet. Few years ago there were silver fir trees at Coedmor, near Nant Ffrancon, measuring eight feet in circumference. A sycamore at Pentir, a situation about one-third as high as the Peak of Snowdon, measures 9½ feet in circumference at the height of four feet.

Mr. Assheton Smith has about 2000 oak trees growing in a very high situation at Talmignedd, near Berthgelert; intermixed with birch, some of them measuring five feet in circumference. His woodlands upon the Vaenol estate amount to about 200 acres.

It is reported that in six years, from 1754 to 1760, upwards of 50,000*l*. worth of forest oak were sold from the Gwydir estate, and floated down the Conway: and at that time, timber could not have fetched above one-fourth of its present price. Even now, the woods above Gwydir add greatly to the picturesque scenery of the Llanrwst vale; and form part of a subject well calculated to give full scope to the descriptive powers of a Gilpin.

On the Pont Glâs estate, in this county, the late Sir Edward Lloyd, Bart. of Pengwern, planted above 320,000 trees, and the greater number of them oak.

The late Lord Penrhyn was likewise a great planter in North Wales, as well as in the West Indies. His

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would grow to the size of about two tons each. The smaller the diameter of the old stump the better; for if once the young tree will become able to surround its parent stock, and contain it entirely within itself as a nucleus, it will succeed well.

Lordship began planting on his Caernarvonshire estate about the year 1780; and from that time to the year 1797, he had planted upon an average between 35,000 and 36,000 trees every year; amounting, in the whole, to 600,000; exclusive of old woodlands enclosed and preserved, where trees spring from old stocks.

3. *Denbighshire.*

The value of Lord Bagot's timber, in and about the Vale of Clwyd, is said to be 50,000*l.*; being by report about one half of the value of the timber upon his Staffordshire estate *.

The Wynnstay and Chirk Castle estates are enriched, as well as highly ornamented, with numerous and valuable woods and plantations. On the latter, they occupy 500 acres within the parish of Chirk; being extremely well protected, and consequently flourishing.

The woods near Erthig, the seat of Simon York, Esq. are laid out in a very elegant style. Nature chose the situation for Art to exert her utmost powers to adorn. The woods envelop in their bosom a pentagonal encampment, erected at some remote period on the summit of Watt's dyke. By their evergreen shade mitigating the winter's cold, and their universal foliage softening the heat of summer, those who gratify themselves with frequenting their serpentine walks, may imagine the whole year to be reduced to the medium of a perpetual spring. This is the only spot in North

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* This timber was full grown, and uncommonly large, when Dr. Plott published his Natural History of the county, in the year 1686. The Doctor records the dimensions of a witch-elm felled in Sir Walter Bagot's park, in the year 1674; measuring in the whole about 4850 feet.

Wales, where the queen of melody, the nightingale, has been heard chanting her nocturnal airs.

Of the growth of timber in the Vale of Clwyd, the oak and sycamore at Pool Park, and at Lleweni; the ash at Glanywern; the chesnut at Bachymbyd; the elm at Cotton Hall; and the poplar at Rhyd-kilgwyn, afford favourable specimens.

4. *Flintshire.*

The plantations of the late Sir Edward Lloyd, appear in every part of the district: one hundred and sixty-two thousand trees, many of them being oak, were his allotment to this county.

In the woods near Bod-Tryddan, the seat of the Dean of St. Asaph, are several species of trees of uncommon size, considering their situation to be within three miles of a western sea: but the malignity of the winds may have been mitigated by the Isle of Anglesey at a distance to the west, and by the Caernarvonshire hills to the south-west. Here are forest oak twelve feet in circumference, at the height of five feet; sycamore, elm, and ash, of extraordinary bulk. The bay trees are of a very uncommon size; some having grown to the heighth of thirty feet. One stem bearing nine branches; the three largest measuring thirty-three, twenty-eight, and twenty-three inches in circumference.

5. *Meirionyddshire.*

This county, once as naked of woods as any in Wales, begins now to be better clad.

Sir Robert W. Vaughan has all his woodlands well fenced, thinned, and otherwise improved by such absolutely necessary operations as were entirely neglected before the estate became his property.

Lord Powys, Sir Edward Price Lloyd, Mr. York, Mr. Oakeley, and several others, constantly employ professed woodmen; which every proprietor of large property, who would wish to augment the value of his timber, should do. The first part of the woodman's care is to see the fences complete, so as effectually to keep out all domestic animals which are inclined to injure the bark and boughs of young trees. Mr. Oakeley has lately enclosed a coppice of 153 acres with 728 roods of stone wall, five feet and an half high; and a deep foss of 91 roods on the lower side, which serves also to drain a turbary meadow. All his fenced woodlands, preserved from the depredations of both tenants and cattle, amount to above 300 acres.

A strong instance of the necessity of screening oak from sea winds, occurs in this wood. The trees on many acres of it, being about four feet in circumference, were felled in the year 1745. On a part of this tract, sheltered by an adjoining hill, a succession of oak followed, which now measure about a foot square each. On the other part, being a rising ground, and fully exposed to the west wind, not a germ appeared until of late years; when the oak between them and the west had grown so as to afford them shelter on one side, and the wall had been built to protect them on the other. They are now very numerous, and thriving; after having lain dormant upwards of forty years.

The woods and plantations on Rhiwlas estate, near Bala, are well preserved, and extensive.

The timber, poles for the Pembrokeshire coalieries, charcoal, and bark, of the weedings of Mr. Oakeley's woods, converted from such of the inferior sort as obstructed the growth of the others, have for some time back, brought him in about 400*l.* a year.

The peasants of this county, still, frequently chant with the harp, some verses composed in celebration of a noted oak tree, which formerly grew on Mr. Oakeley's estate, at Ganllwyd in the parish of Llanddwywai. The trunk of fifteen feet in length, and twenty-five feet and an half in circumference, measured 609 cubic feet. From the fork it divided into several branches; three of which extended to a further length of forty-five feet[*], and were large enough for mill-shafts. This king-tree was held in such veneration by the people, that the verses reprobate the undruidical and execrable deed of depriving the forest of its monarch. Acorns from it, were sent for, and planted in different parts of the country, and as many of its offspring as are now standing, verify the axiom in the operations of Nature, that *like begets like*, among the various tribes of the vegetable, as well as of the animal world. There are about half a dozen of its descendants now standing on Tan y Bwlch demesne; one measuring nine feet and an half in circumference at the height of five feet. They are all uniformly of the shape, though not of the size, of their majestic sire: short butts, and widely extended horizontal branches; being a most excellent shape for the shading of cattle in the midst of lawns. There is another venerable trunk now standing in the wood adjoining the spot where the king-tree grew, measuring 23 feet in circumference. Some persons say that a short butt with a large spreading canopy of branches, is the general characteristic of the oak; and that it grows lengthy owing to its confinement in close coppices, &c. But naturalists enumerate several species of oak.

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[*] These three branches, including the length of the butt, may be said to be each twenty yards in length; which explains the dimension inserted in one of the verses,—"*Tri-ugeinllath tw' r Ganllwyd.*" There are some old persons now living, who remember the *Brenhinbren* standing.

The foregoing circumstances are recorded, only to shew that there are situations and soil, even in this county, in which timber will acquire a large growth.

The Vale of Edernion, in the eastern part of this county, has been considerably ornamented by recent plantations.

	Forest Trees.
On Rûg estate, were planted, in the year 1787, by the late Col. Salesbury, ...	82,000
On the same estate, in the year 1796,.............	42,000
Of the intermediate years no information could be procured.	
On Plâs Edernion estate, the property of Bell Lloyd, Esq. about	100,000

Of these, 50,000 were planted between the years 1792 and 1797.

Dr. Thackery lately received a gold medal from the Society of Arts, for his extensive plantations in this county and that of Denbigh.

6. *Montgomeryshire.*

We come now to that which was, and is, and will be for some years, the best wooded county in North Wales; and of its size, one of the best in the kingdom. The woods were so abundant that, less than a century back, the fuel of a great part of the county consisted almost entirely of the best cleft timber; which, within about eighty years ago, began to be of some value, on finding its way to the Navy market. The first sale in this country, for the Navy, was from Abertanat wood, on the confines of Shropshire. About the year 1750, the woods of Powys-Castle park, Aber Nait, and Trev-Edryd, followed. From that period to the present time, the county has contributed annually to the supply of the Navy, and of the commerce of the nation. About the year 1770, the size and quality of the Montgomeryshire oak, were so well known in the several dock-yards, especially those of Plymouth and Deptford, that a great competition between buyers was the consequence; which raised their price above that of the timber of any other part, in similar situations; even of the counties of Hereford and Monmouth, which lay much more convenient for water-carriage, and accordingly ought to have sold higher. It is but of late years that this phrenzy of competition subsided. The timber merchants, when too late, saw their error; retired, and the market became reduced to its equable standard.

In the reign of *Henry the Third*, the timber on the Vaenor estate was destroyed, *cum privilegio regis*, to cut off the retreat of the Welsh: in the reign of *George the Third*, it was converted to a more laudable purpose, to assist in perpetuating to Britain the sovereignty of the seas. The fall at Vaenor park, in the year 1796, deprived the county of much of its most valuable timber; of which, the following were some of the most noted dimensions.

One oak measured 68 inches in circumference at the height of 73 feet. Another measured 687 cubic feet, and was valued at 2*s.* per foot, exclusive of bark. A third was converted as followeth:—The butt piece, 25 feet long, into an upper piece of a stem for a first-rate ship: it was sided to 30 inches, and measured in the round 225 feet. The second length, twenty-eight feet and an half, was converted into two wing transoms for third rates, sided to 14 inches each for the whole length of the piece, and bearing a moulding of 27 inches in the middle: its solid contents 200 feet. The largest bough, 20 feet long, sided to 15 inches, made a lower futtock for a third rate, and measured in the round 40 feet. The other boughs, converted into standard knees, &c. measured 60 feet; making the amount of the whole tree to be 525 feet. There were in the park a great number of oak measuring 400 and 450 feet each; all forest timber.

The late Arthur Blayney, of Gregynog, Esq. was peculiarly careful in the preservation, and in promoting the growth of his timber.

On the Garth estate, near Welsh Pool, there are, according to computation, about 30,000*l*. worth of choice navy timber. Some of the finer forest oak measure from ten to twelve feet in circumference. One in particular, in the parish of Myvod, measured 50 feet in length, and ten feet in circumference in the middle.

Strangers have oftentimes listened with attention to gentlemen of this county enquiring anxiously into the conduct and fate of the Windsor Castle, the Impregnable, the Brunswick, and other men of war, in some particular naval engagements; and were led to imagine that they had some near and dear relations holding important commissions on board: but upon farther enquiry, found the ground of the curiosity to be no other than that such ships had been partly built of timber that had grown upon their estates; as if the inanimate material contained some magic virtue!

It must nevertheless be confessed, that the land owners in Montgomeryshire have, in general, displayed greater assiduity in clearing their estates of timber, than in planting a succession; or even in protecting copse wood, which is a very cheap method of raising trees. Whenever a crop of timber is cleared off a piece of land, were it immediately enclosed, the necessity of replanting it would be superseded by an abundance of shoots springing up from the acorns, and other mast, either recently imbedded, or which had lain for a long time in the soil. Lord Powys's woodlands afford luxuriant demonstrations of this truth.

However, among our few Montgomeryshire planters, the late Bell Lloyd, Esq. of Bodvach, has merited the first rank; and must not be left unnoticed. Whether he be considered as a most amiable man in all private affairs, or a most active man in all public concerns; every person of feeling who has heard of his character, and every man of taste who has seen his extensive improvements, must certainly revere his memory.

His plantations in the neighbourhood of Bodvach, covering above 61 acres, amount to about 171,000 trees; consisting of firs, pines, pineasters, larch, beech, &c. and upwards of 5000 oak. In the parishes of Kerry, and Llandyssul, he also planted about 33,000, making the whole of his Montgomeryshire plantations to amount to 204,000 trees. He raised 80,000 trees more at Bodvach, all from seed; which he transplanted into other counties, upon his own estates, and those of his uncle, the late Sir Edward Lloyd. His son, the present Sir Edward Price Lloyd, pursues the same spirited method of improving the face of the country. In the years 1795, 1796, and 1797, he planted upwards of 125,000 trees; whereof 84,900 were on his Caernarvonshire estate, in the parishes of Ysbytty and Penmachno; 27,000 in the vicinity of Pengwern, in the county of Flint; and the remaining 13,000 and upwards, in the parishes of Llanfyllin and Treveglwys, in Montgomeryshire. Out of the whole, about 75,000 were Scotch pines, and spruce firs; and about 50,000 oak and ash.

Since the years 1798 and 1799, when the foregoing informations were collected, hundreds of thousands of forest trees have been additionally planted in different parts of the district. Gold medals have been merited and received from the Society of Arts, by gentlemen who have made extensive plantations, upon the liberal policy of improving the face of the country, and enjoying a remote prospect of benefiting posterity.

Proprietors planting upon a large scale, and not raising trees from seed in their own nurseries, were formerly used to procure seedlings of larch, firs, and pines, &c. from Scotland; but owing to their heating in close bundles, and otherwise damaging upon the road, not above one half, and frequently not above one fourth, of the number, could be expected to grow. They are now more given to encourage nurserymen at home; and nurseries are accordingly established in different parts of the district; from Anglesey on the west to the Severn and the Dee on the east. Mr. John Williams, of Burgedin near Welsh Pool, manages a very extensive concern in the nursery line, and meets with great encouragement. In order to assure his customers that his prices are very moderate, in the appendix to his last printed catalogue of forest trees, &c. he advertises,—"One and two-year-old seedlings of all sorts of forest trees, nearly as cheap as in Scotland, reckoning carriage, and one thousand worth two of theirs."—This is true, when the tenderness of seedlings, distance of carriage, and length of time, are considered. Mr. Williams, and other nurserymen, ensure trees of their own growth and planting for a number of years.

Thus reading one side of the leaf, the page is replete with pleasant intelligence; but turn the other side, and a melancholy prospect of the state of our country, respecting timber, at no great distance of time, forces itself upon the mind. With respect to the immense quantities of timber lately sold, and the great numbers of young trees lately planted, we may be aptly compared to a province whose effective population has been swept away to supply the deficiencies caused by the ravages of war; and whose places at home are attempted to be supplied by introducing fresh colonies of newborn infants. How can the state be supported during the imbecility of these infants; until they become capable of the arts of either peace or war? We are nearly already in a similar dilemma.

In the year 1798, the writer hereof amused himself in calculating the value of navy timber upon several estates within the district. The most valuable tract, of its size, was a piece of 56 acres covered with majestic timber; the value of which could be no less than twelve times that of the fee-simple of the land they grew upon, at 30 years purchase. These, and several others not much inferior, were then intended to be reported, as valuable specimens of the national stock of growing timber; but they are *now*, nearly all, either crowding the dock-yards or swimming upon the ocean.

The present price of from 11 to 14 pounds per ton, in the wood, for oak bark, is so extravagant, that more liberal principles than avarice cannot withstand the temptation of sacrificing every future consideration to present profit; and, consequently, an exterminating warfare is yearly carried on against our woods and forests;—half grown timber, even saplings,—and the straggling clumps which enlivened the scene, and decorated the rocks of Snowdon, are dragged in the general and undistinguishing conscription.

The royal forests, and noblemen and gentlemen's parks, will soon be the only spots exhibiting timber of suitable dimensions for the purposes of the Navy. The establishment of foreign dock-yards, to build ships of East-Indian teak or North-American timber, if at all feasible, ought to have been earlier adopted, as a prudent state policy.

Were a real substitute for oak bark in tanning found out, it would be a most valuable discovery. There would be no temptation then to cut down saplings; and consequently they would universally be permitted to grow into timber.

There is nothing peculiar to this district in the management of oak bark. The trees are butted, or peeled to the height of five feet, before they are felled. The harvesting is more simple than it was formerly, the bark being laid to dry on the butts, and on scaffolding of small boughs. The first motion of the sap is watched, that no time may be lost. Dr. Darwin, in Phytologia, says that there is more of the tanning principle in bark during winter; but what use can the discovery be of, unless the Doctor, from his great facility of invention, had contrived an apparatus to convey the fluid of the aurora borealis to operate on the bark in the winter season? This does not seem to be less feasible than his scheme towards cooling the equatorial regions with cargoes of ice from the polar circles.

That different kinds of trees thrive better in different soils, is an indisputable fact; but the oak seems to have a great capacity of adapting itself to varieties of soils and situations: extreme bleakness of exposure, and the sea spray, are its greatest foes. The first rate timber may be expected on strong clayey soils; and the second rate is frequently to be found on soils of a contrary description. That depth of soil is not the exclusive pabulum of trees, is evident from oak, containing about 50 feet of timber, and upwards, growing upon the bare rock, with their roots extended along the surface, the whole length of the trunk, perhaps 20 or 30 feet, as it were in quest of crevices, where they may find support.

Trees are of a slow, or stunted growth, more owing to bleakness of exposure than any other cause. Upon a dry soil, not above six inches deep, over a substratum of shaly rock, germens, as they are provincially called, or oak trees springing from old stumps, are known to have required 73 years to arrive at the size of from 40 to 50 inches circumference, at the height of five feet; but they were exposed to the north and west winds. Whereas the Vaenor large oaks, just before described, though growing in a shallow hazel mould upon a rocky substratum; yet, owing to their being sheltered from the more boisterous winds, they had attained the extraordinary size of from four to eleven tons each.

The bird-cherry tree, naturally a native of elevated situations, and seldom larger than a shrub, and accordingly deemed underwood; yet, in the undisturbed air of a deep dingle, sheltered from all winds, in the parish of Manafon, it has arrived at the size of about six feet circumference in the butt, and its branches of the second growth, are of the size of barge mast poles, and from 30 to 40 feet in length. The soil dry, poor, and shallow. The branches of a tree, and even every individual bud, act as so many mouths to convey nourishment to the trunk; and it is probable, from the above observations, &c. that it derives more food from the air than from the soil. And though close planting be absolutely necessary in bleak situations, to cherish the growth of trees during their infancy, yet the plantation should never be so much encumbered with number, as to diminish the vigour of the branches, and consequently of the mouths which inhale food for the trunk from the atmosphere. A stripling pole, in a confined clump, must be deprived of all its lateral branches; and cannot be found, by the nicest observation, to make the least progress in growth; whereas a healthy sapling, unconfined, is found by observation to grow annually from one to three inches in circumference. Every thick plantation, of a certain number of years growth, verifies what is here stated. One instance, in particular, may be worthy of record. It is a plantation of black poplars on Tre-ffin estate, in Montgomeryshire, the property of the late Rev. Thomas Jones, of Trinity College, Cambridge. Situation, in a dingle extending from north-east to south-west, and adjoining a brook; soil, alluvial, or mixed gravel and loam; circumstances considered as favourable to the growth of poplars. The following plan is added for a fuller exemplification of the subject in question.

	1	10	19	28	37	46	
	2	11	20	29	38	47	
	3	12	21	30	39	48	
	4	13	22	31	40	49	
Brook	5	14	23	32	41	50	South-east.
	6	15	24	33	42	51	
	7	16	25	34	43	52	
	8	17	26	35	44	53	
	9	18	27	36	45	54	

South-west.

The trees in the line from 1 to 9, adjoining the brook, are of late planting, and do not come at present under observation. The line from 9 to 54, is open to the South-west. The line from 46 to 54, is more confined by an adjoining rising ground. The line from 1 to 46, and all the interior lines, have no freedom of expansion.

Dimensions and particulars, taken in the year 1805.

The four interior lines are of 31 years growth; and the line from 46 to 54, is only 25 years.

No. 54, is exposed on two sides; its lateral branches towards those points vigorous: circumference at five feet height—6 feet 2 inches.

No. 45, has only one side exposed, so as to throw out lateral branches; girt at the same height—5 feet 4½ inches. These two had been shredded.

	Feet.	*In.*
No. 36, never shredded; exposure the same as No. 45; girt	5	6
No. 27, shredded, when young, for experiment; girt only	3	4
No. 18, exposed on two sides, branches luxuriant; girt	5	5½
No. 44, few branches owing to confinement; girt	4	3
No. 43, Do. Do.	3	0
No. 42, Do. and growing in a wetter spot, girt	2	5½

It is here worthy of observation, that those trees which have a space for the extension of their branches, and those which have never been shredded, are of the largest growth; so much so, that No. 54, is six times the solid content at twelve feet high of No. 42, though it is six years younger; and every circumstance considered, it may be eight times the value. These particular numbers are not selected for the sake of theory; the exterior trees are universally larger and more valuable than the interior trees; and that nearly in the same proportion as those here specified. The poplars were not planted so close as trees appear in plantations in general; they might be at from nine to twelve feet distance.

Too close planting of trees, in dingles or sheltered situations, and pruning, or shredding, are certainly highly injurious to the growth of timber. There are three material points gained in not pruning trees.

1. The tree, as an object, is more beautiful.

2. Its botanic character is preserved.

3. Its health is not impaired, and consequently its growth is not retarded.

In wet corners, where draining would be either too expensive, or impracticable, aquatic trees, such as the hop and Huntingdon willow, &c. ought to be planted. The readiest way of growing them is from truncheons dibbled about two-thirds of their length into the soil, with an iron bar, to prevent the bark being injured by thusting them in the common way.

The quickness of growth of all trees depends upon the appropriateness of their situation; and the quality of the wood of every tree varies in proportion to its quickness of growth: hence the propriety of adapting trees to soils and situations.

Were trees, as well as other plants, judiciously adapted to their peculiar soils and situations; that extensive and sterile waste, which now impoverishes the country, and disgraces its inhabitants, might be much diminished. Lands are barren, not so much from the nature of the soil, as from men not knowing its proper management. There are trees and plants well adapted to varieties of climates; perhaps so much as to bear transplantation from the plains of Lombardy to the skirts of Snowdon. Providence has undoubtedly been more kind in this respect, than we seem to have yet discovered. To select, appropriate, and naturalize, some valuable exotics to British soils and climate, the sister arts of botany and chemistry, will lend to agriculture their willing aid.

While we have such extensive wastes, capable of bearing firs, and pines, without number, why must we be indebted annually to foreign nations; why must we depend upon precarious treaties, for such great quantities of pitch, tar, rosin, and turpentine? and if commerce must be indulged, let it be employed in other channels, less detrimental to the nation.

Cork trees grow to great perfection in the Pyrenean mountains, in the north parts of America, and in the most scanty soils*.

The Cytisus Alpinus, or Laburnum, its wood nearly equal to that of mahogany, grows every where in the Alps, to tall timber; but in richer soils expends itself in branches. Its leaves, in times of scarcity, have, moreover, been found a most excellent forage†. It is called also shrub trefoil; cattle and sheep are exceedingly fond of it. It is useful in plantations, for hares to browse; for as long as it lasts, they will scarcely touch any other tree.

The sugar-maple of North America, grows to the height of 60 or 70 feet; and flourishes in all climates, from the 30th to the 60th degree of latitude‡.

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* Campbell's Political Survey. † Id.

‡ Mem. Acad. Par. 1730.

From the 43d of Elizabeth to the 13th of his present Majesty, several statutes have been enacted, " For the better Preservation of Timber Trees, Woods, and Underwoods, &c." but they all seem to be deficient in not extending the penalties to *Tenants*, as well as to other offenders, by the same process in law ; that is, on conviction before a magistrate; and not as it is at present, by a tedious action, and Impeachment of Waste. By these means, tenants may injure their landlords' property with impunity, under a plea of special ownership, and interest, in the trees, for shade, mast, fire, hedge, and plough botes. This special ownership should be annihilated by law, and reduced to that in shade, and mast; to prevent the farther progress of that shameful appearance of pollards, which so much disgraces the country, especially the county of Montgomery. This county abounds with common wastes where oak grow naturally; but are perpetually kept under by the browsing of cattle, and by poor people who cut them for fuel. The lord of the manor of Arwystli, by consent of the freeholders of one township, enclosed 26 acres of such oakland, and having cut the stunted underwood, they shot germens of six and seven feet in length the first year ; and they still continue to promise well: but it is to be supposed, that in such instances, the freeholders would require some compensation for their loss of commonage, of the lord of the manor, who will have the exclusive property of the wood as soon as it can be called timber.

CHAP. XI.

WASTES.

[This Chapter was written in the year 1799; the enclosures of wastes that have taken place since that date, will be inserted at the conclusion. This mode has been preferred, as it shews the state of the wastes at the time, as well as the progress and extent of improvement since.]

THE commons, or waste lands, in *Anglesey*, amount to between 12,000 and 13,000 acres; whereof about 9000 are level, and highly improveable. At present, they yield but very little profit; having their surface continually pared by the poor for fuel.

Out of the above estimate of the acreage of the wastes, some part of the measurement of Malldraeth Marsh should be deducted; which has undergone a kind of division, and some pieces of it are lett at one guinea per acre.

This marsh is situate near Newborough, in the southern corner of the island, and contains about 3000 acres. In the year 1788, an Act of Parliament was procured for its division and enclosure. An embankment, about 1400 yards in length, across the marsh, was the first thing to be done, to repel the current of the tide. Reputable engineers were employed; and the work was prosecuted with spirit, until the year 1790, when the Commissioners found it necessary to apply for another Act of Parliament, which should give them a more specific power to enforce contributions from the proprietors of the marsh. Such is the syntax of many of our Acts of Parliament, that this last Act also failed in gaining the desired end. The embankment was brought forward from both sides at the same time, and was intended to be joined in the middle of the marsh, where the force of the tide was *greatest*. Whether this were good engineering, must be left for the Brindleys of the day to decide. However, an embankment was formed* for about 1200 yards, which was within about 20 roods of a complete junction, when, owing to some of the proprietors withholding their dividends, the work was meanly deserted, after expending nearly 12,000*l.*, and when a few pounds more would have completed the whole, as the materials were already carried on the spot. On the 23d of January, 1796, an uncommonly high tide added 20 roods more to the breach, in which state it now lies. It is reported, that a company of adventurers lately offered to purchase the marsh, and complete the embankment, which would cost about 2000*l.*; but that the proposal was rejected. About 700 acres of sands, between the embankment and the sea, might probably at first have been added to the redeemable waste; but it is urged, that the present embankment has been begun too near the sea; and had it been formed 500 yards more inland, the expense would not have exceeded 7000*l.*; and besides, that the sands alluded to were of no value. This latter assertion is not well founded: the sands, being properly managed, would produce abundant crops of lucern, and such like grasses.

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* The embankment was made of furze faggots, bound with double cordage; covered with sand; then with sods; and on the sea-side with a stone pavement, 18 inches deep at the top, and diminishing to nine inches at the bottom. It was 51 yards wide at the base, four yards at the summit, and five yards high: batter of the sea-side to that of the land side, as seven to four.

The good effects of the completion of this embankment, and drainage of the marsh, exclusive of recovering so many thousand acres of rich pasture, would be the expulsion of agues and fevers from the neighbourhood; and facilitating the working of the coal-pits in its vicinity, which are now inundated at high water. The river Kaint might be made navigable up to Llangefni post road; by which means coal might be brought by water into the centre of the island; and were it free of duty, limestone being on the spot, manure might be plentifully afforded.

2. *Caernarvonshire.*

There is less improveable waste land in this county, than in Anglesey, in proportion to their respective extent. In the latter, there are not above five hills, and neither of them extensive. The former, the promontory of Lleyn excepted, seems to be an entire assemblage of huge rocks; some of which, such as Snowdon, are common; others, by grants from the Welsh Princes, are, up to their very summits, claimed as private property.

The largest improveable wastes are Rhôs Hirwen, and Mynytho, both in Lleyn, consisting together of about 5000 acres.

Morva Dinlle, a sandy marsh, with some clay, extending from Dinas Dinlle, a British encampment, to the mouth of the Menai, near Caernarvon;—2560 acres.

Several large tracts of private property may very properly be styled *wastes*, though not common, in their present unproductive state; such as about 400 acres of marshy ground between Penmorva and the sea; and several thousands of acres in similar condition. The whole length of the road from Trallwyn to Llanælhaern, under Carngiwch Hill and church, is for many miles surrounded with meadows and pastures, if they deserve the name, producing nothing but rushes, carexes, dwarf-willow, bog-myrtle, and moss; but by the good crop of red meadow-trefoil, and *holcus mollis*, seen on one small piece of the tract, one may judge what might be done, even in that situation, were the country universally inspired with the spirit of improvement. Plantations are absolutely necessary to render genial the climate in this forlorn waste: then fencing, draining, and skilful tillage, would cause plenty to smile o'er the barren desert.

Conway Marsh lies near the town of that name; and consists of about 200 acres of a fertile sandy loam. All who have a right of common pay a tribute to the corporation, which at present is 6*s*. per beast per year, and turn in May 18th. The corporation advance the tribute paid, at option; which seems incompatible with the *right* of common.

3. *Meirionyddshire*.

Next to Caernarvonshire, this is the most mountainous county within the district. Several mountains are private property up to their very summits; others bid defiance to all attempts at their cultivation. The acreage of the county has been rated at 430,000 acres; out of which 286,000 may be unenclosed; and of that number, about 35,000 acres may be called improveable wastes. All the marshes on the sea-coast, from Aberdyvi on the confine of Cardiganshire, to Pont Aberglaslyn on that of Caernarvonshire, are of that description. In the vicinity of Tywyn is a common of 600 acres, one moiety thereof being sound land, the other a drainable turbary; all very level, and bordering on the highly improved turbary grounds of Mr. Corbet. Harlech Marsh contains some hundreds of acres of sound soil.

The embankment and improvement of Traeth Mawr and Traeth Bÿchan sands, have been above 170 years in contemplation; and never yet performed. In 1625, Sir John Wynne of Gwydir intended to have brought over Sir Hugh Myddleton, the celebrated engineer, to undertake the work: but no materials were wasted, save ink and paper*. Unfortunately, those patriotic men were then too far advanced in years to complete such a great design †. In the year 1719, some Dutch adventurers made a proposal to the proprietors, but to no effect. In 1770, the late Bell Lloyd, Esq. who was always active in works of public utility, and others, brought the subject afresh under consideration; at the same time proposing a nearer road from London to Dublin, across the Traeth Mawr sands, when embanked ‡. Mr. Golborne, the engineer, was sent down by the Duke of Ancaster, and two estimates were made; one at 20,000*l.* enclosing 2000 acres, the other at 30,000*l.* enclosing 3000 acres. The late Dr. Worthington §, was peculiarly active in forwarding the work.

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[*] See Sir John's Letter, and Sir Hugh's Answer, in the Appendix, Nos. V. and VI.

[†] Sir John died the following year, 1626, in his 73d year; and Sir Hugh died in 1631.

[‡] See the Proposals for the Embankment and the Road, in the Appendix, No. VII.

[§] Vicar of Llanrhaiadr, in the diocese of St. Asaph.

He had gone so far as to procure subscriptions to the amount of 29,000*l.* and upwards, when the whole scheme was frustrated by the mean spirit and refractoriness of some neighbouring proprietors.

Mr. Golborne proposed the direction of the 30,000*l.* embankment, from Trwyn y Garth on the Meirionyddshire side, to Ynys Hir on that of Caernarvonshire. It was with some a subject of consideration, whether the rivers of the two marshes, or *Traethau*, could not be united, and conducted in one stream to Porthystyvnog, on the Caernarvonshire side; and let thence, by a level through the rock, and valved flood-gates, into the sea; and whether an embankment could not be formed from Porthystyvnog to the north-western extremity of Llanvihangel Isle. The tides would probably, in time, form the embankment with very little artificial aid. That the sea is now in its recedure from that coast, seems evident from the high mounds of sand cast up by it, to the west of Harlech Marsh. Were this scheme practicable, and put in execution, the redeemed waste, instead of 3000, as proposed by Mr. Golborne, would amount to 5000 acres: a valuable acquisition to the national territory.

4. *Denbighshire*, 5. *Flintshire*, 6. *Montgomeryshire*.

These three are the only counties in which common wastes have hitherto been divided and enclosed to any good effect, or considerable amount. The following table contains the several particulars of the enclosures in the three counties:

Counties.	Names of Manors or Wastes.	Date of the Act.	Lord of the Manor's Share.	Acreage of each Enclosure.	Total A age wit the Cou
Flintshire.	1. White Sands, in the estuary of the Dee	6th & 14th Geo. II.	—	3,100	18,9
	2. Saltney Marsh	1778	1/15	2,200	
	3. Hope	1791	1/13	3,500	
	4. Mold	1792	1/15	4,000	
	5. Kilken	1793	1/20	2,400	
	6. Part of Rhuddlan Marsh	1794	—	200	
	7. Skeiviog, Nannerch, and Whitford	—	—	3,500	
Denbighshire.	8. Llanverres	1793	1/20	1,800	2,1
	9. Part of Rhuddlan Marsh	1794	—	300	
Montgomeryshire.	10. Globwll and Bachau ..	1775	—	125	42,7
	11. Strata Marcellina, Tir y Myneich, and Deuddwr	1788	1/18	2,600	
	12. Plas Dinas, and Mechain Iscoed	1789	1/18	5,000	
	13. Kedewain ...... Hopetown ...... Overgorddwr	1796	1/13	15,000	
	14. Kerry	1797	1/13	20,000	
	Total number of acres enclosed, and to be enclosed, in the three counties, in the year 1799				63,7

Some farther Account of the foregoing Enclosures.

No. 1. *White Sands, in the Estuary of the Dee.*—In the year 1732, Kinderley, and others, procured an Act of Parliament, to "enable the Mayor and Citizens of Chester to recover and preserve the Navigation of the River Dee;" and by a subsequent Act, in the year 1740, William Alix, and others, were incorporated into a body bearing a long title, which has since been abbreviated into "*The River Dee Company*;" who, by the said Acts, and others of the 17th and 26th of

Geo. II. for their expenses in recovering and preserving the said navigation, had a grant of all the white sands, or such as then produced no grass, within the estuary of the Dee, from the walls of Chester to the extremity of Wirral, on the Cheshire side, and to the point of Air, on that of Flintshire.

The first policy of the Company was to change and direct the course of the river; and accordingly, by the 26th of Geo. II. they were empowered to purchase, from the lord and freeholders of the manor of Hawarden, about 600 acres of waste marsh land, through which they cut a new channel for the Dee. By this, and by several embankments made in the years 1754, 1763, 1769, and 1790, to keep out the tide and land floods, they have been enabled to gain the afore-mentioned 3100 acres; which are now covered, even the inner sides of the embankments, with good crops of corn, of lucern, and of other grasses: and the whole redeemed waste is incorporated into a township, bearing the very appropriate name of *Sealand*.

The purchasing of the Hawarden waste for the new channel of the Dee, was a policy by which all parties, and of course the public, are gainers. The Company have thereby got the fee-simple of a profitable estate; the lord of the manor, besides his share of 600*l*. purchase-money then in hand paid, and of 250*l*. annuity for ever, having the Advowson of the Rectory of Hawarden, has by the enclosures considerably increased the value of the tithes; and the freeholders find the parochial rates somewhat lessened, by applying the 250*l*. annuity towards defraying them.

Marsh lands still unenclosed within the estuary of the Dee, in Flintshire; viz.

	Acres.
Adjoining the embankments of the Company	300
Near the villages of Burton and Shotwick	120
These parts, by the dereliction of the sea, and incipient vegetation, are naturally and gradually forming themselves into fertile soil.	
Above and below the town of Flint, being land of the richest quality	1300
	1720

2. *Saltney Marsh.*—The rental of this enclosure is about 3000*l.* some of the strong soils letting at 30*s.* per acre, and the sandy parts at 20*s.* Crops of grain well managed; but the grass-lands are more neglected, which appears somewhat extraordinary in this land of cheese.

4. *Mold.*—Such parts only of this enclosure as were sold to defray the expenses, have as yet been brought under cultivation. The crops of wheat in 1796 were very abundant. That grain selling in July and August so high as 12*s.* and 14*s.* per bushel, the crops were sold upon the fields at from 10 to 11 guineas per acre; and the market dropping after harvest to 8*s.* 9*d.* per bushel, the straw was all the profit of the purchaser. The crops in 1797, succeeding the wheat, were barley and clover; for which no more than five or six guineas an acre were offered. The allotments sold from five pounds to eight pounds per acre, in their uncultivated state.

5. *Kilken, and,* 8. *Llanverres.*—The soils of these wastes were of various kinds; some clayey, some gravelly, and hazel mould, on a base of limestone.

The late Mr. Lloyd, vicar of Kilken, having purchased an allotment of the clayey soil, carried limestone thereon at the rate of 20 tons per acre, which was equal to 13 tons of burnt lime. One part was push-ploughed at the rate of 16*s.* per acre; and the sods, being collected, were mixed with quick-lime, fresh from the sod-kilns burnt on the spot, layer upon layer; and water being regularly thrown upon every stratum of lime, the whole mass was quickly reduced into an excellent homogeneous manure. The other part was completely fallowed, and limed in the common way. The first kind of management procured the best crop; yielding full twelve returns of clean corn.

Some of the seed was sown pickled, or steeped in a compost of brine, urine, and slacked lime, and some was sown in its simple state; the result was what he naturally expected,—*no* difference of crop.

6.—9. *Rhuddlan Marsh.*—This common, lying near the town of that name, between St. Asaph and the sea, contains in the whole about 27,000 acres, of a rich sandy loam; whereof 500 acres were appointed by the Act to be sold, towards defraying the expenses of securing the whole marsh, by an embankment, from the encroachments of the sea, which has alarmed the proprietors, by having committed some ravages on Tywyn Abergeleu, a neighbouring waste.

The embankment is to be nearly eight miles in length; and of various dimensions, according to the force of the tide. In August 1799, about a mile and an half of it had been completed, in the *most difficult part:* measuring 80 feet in the base, seven feet at the top, and eight feet deep. The estimate of the whole embankment and drainage had been brought in at 13,500*l.* About one-half of the allotment to be sold had been then disposed of; some parts selling at 30*l.* and some so high as 35*l.* per acre, in their unimproved state.

10. *Globwll and Bachau*—Are two townships in the parish of Llanfyllin. The late Bell Lloyd, Esq. was the chief promoter of procuring an Act for the enclosure and sale of these small wastes; and the profits arising therefrom were laid out in building a new market-house in Llanfyllin.

11. *Strata Marcellina, Tirymyneick, and Deuddwr.*—If ever the metaphor of the Asiatic Bard, of "vallies standing so thick with corn that they laughed and sang," could be applied to any part within this district, it might have been to the enclosed wastes within the manor of Deuddwr, near the confluence of the rivers Severn and Vyrnwy, when they bore the first and second years crops. It will, however, be seen in time, whether the fertility of the soil can possibly be exhausted; for it is actually put to the farmer's ordeal of oats, wheat, wheat, barley, wheat, &c. &c. &c.

A great part of the lowlands, in these manors, was subject to frequent inundations by the sudden overflowing of the two rivers, Severn and Vyrnwy, especially the former. Hay and corn were not in safety during harvest; the soil of ploughed lands had frequently been swept off by the current; cattle overwhelmed in their pastures, and had oftentimes, for some days, been fed in their stalls, nearly up to their spine in water. These were evils that called aloud for a clause in the

Act, to enable the Commissioners to keep the floods within proper bounds, by embankments. This power was delegated; and the whole, the enclosures and all, completed at the expense of nearly 26,000*l*. The embankment was begun on the Severn, a little below Pool Quay; and continued all the way to Cymmerau, the junction of the two rivers; and from thence extended farther for some miles, up the Vyrnwy towards Llanymyneich.

Some farmers complain, that owing to these embankments, their lands will diminish in fertility, for want of the rich sediment usually deposited thereon by the floods: but there are valves contrived to be opened for occasional irrigation; and if they be neglected, or imperfectly managed, where does the blame lie? There are, it must be allowed, disadvantages attending these embankments, as well as advantages; but if both be put in the balance, the latter must certainly preponderate.

Works of such great expense, and public importance, should never be put too hastily in execution. Skilful men, of the first abilities, should be employed, and consulted; their plans of proceeding more than their estimate of expenses, should be compared, and the best adopted. The fluvial barrier should ever vary its direction; so as not, even obliquely, to receive the momentum of the torrent. The celerity and force of a flood are not so much in proportion to the abstract quantity of water it contains, as to the dimensions of that quantity. A certain body of water, in rapid motion, suppose 400 yards wide and three feet deep, when confined in its channel to 200 yards, will increase its momentum or force of percussion, in a quadruple ratio; or as the squares of the respective depths.

These plain principles being overlooked, the proud

Sabrina, swelling and foaming with indignant rage at the useless attempt of man to check her wonted course, has repeatedly levelled the barrier, and with impunity traversed her old domain. Some few breaches were made in the year 1794, and more, upon a sudden thaw in February, 1795, when the plains were deluged with torrents from the hills, which swept away mills and bridges as well as embankments. These ruptures were repaired; but in the winters of 1797, 1806, and 1808, the river repeated her assaults, and with the same success.

12. *Plâs Dinas and Mechain Iscoed.*—Several parts of these wastes have also been brought under cultivation: and have produced crops, generally superior to those of the neighbouring old enclosures. A piece of ten acres, fallowed, and manured with lime at the rate of 100 bushels per acre, was sown with thirty-one bushels and a quarter of wheat; which produced 337½ bushels, being nearly eleven returns. This was the crop of the year 1794. In 1795, and 1796, oats were successively sown; and wheat again in 1797 with a scanty manuring: but instead of *eleven* returns, as before, the farmer had no cause to complain of *five*.

Some hills have been ploughed, whose sides were so steep as to form an angle of 40 degrees with the horizon. These could not have been ploughed in the common method; and by taking only one plit in a round, the general custom upon such declivities, the work would have proved tedious; therefore, Mr. Edward Evans, of Glanbrogan, near Welsh Pool, invented a kind of turn-wrest plough for the purpose; of which the following is a description: a mould-board on each side, both hinged to the plough-foot, are connected inwardly by an iron rail, which in the act of projecting one mould-board *out*, must necessarily draw the other in. The point of the share is a pivot, turning in the heel of the coulter, for the convenience of having the fin of the share on either side. The beam also, seven feet two inches long, resting upon a bolster two feet five inches in length, by means of a dropper pin, perforating both, turns readily either to the right or to the left: and the beam, in having its direction so changed, by means of strong wire chains moving round a set of trills, acts upon the whole machine, changes the situation of the mould-boards, turns over the fin of the share; and so the right wrest is instantaneously converted into a left-wrest plough, and *vice versa*, without hardly any loss of time, while the horses turn at the end of the furrow. The iron rail, connecting the mould-boards, has several niches in its upper edge to regulate the projection; into which small clickers are dropt to keep the mould-boards steady; and are lifted up again, by means of a cord, convenient to the ploughman's hand, when the change of sides is to take place. A similar contrivance keeps also the share, and beam, steady in their new situations. The beam may be adjusted so as to take a plit of any width; or by being fixed in the centre, without any obliquity of direction, and both mould-boards projecting, the plough is serviceable in the hoeing husbandry, or in opening furrows between the butts on wet soils.

Complexity of machinery is a great objection to many of the new invented implements of husbandry. This plough, by the foregoing description, or even by a plate, may have the appearance of being too complex for general use.

It appears by the foregoing table, that the landowners

owners in Flintshire have been somewhat active in the cultivation of unproductive lands. Fen's Heath, on the confines of Shropshire, and Trepe Wood, an extra-parochial waste, inhabited by about 500 persons, still remain the prey of encroachments, The chief of the Flintshire hills are those of Buckley, Halkin, and Tegengl; which are extensive, and a great part of them cultivable.

In Denbighshire, legal enclosures have been small indeed; notwithstanding about one half of the county may be deemed waste. The *Green*, and other commons, in the vicinity of Denbigh, where land lets so high as from two to six guineas per acre, consist of about 2000 acres of very cultivable soil.

Before the four Acts of enclosure were obtained in Montgomeryshire, about one half of the county was reckoned *waste*; and there remains still about 200,000 acres of that description. Many of the hills have depth of soil; and are covered with moss, fern and grass, up to their very summits. The higher mountains abound with heath and turbaries; and perhaps they cannot be more advantageously applied, than to the summering of hardy sheep, and producing a commonage of fuel, where wood is too scarce, and coal at too great a distance.

It might be expected that every class of society would be benefited by the division, enclosure, and cultivation of wastes. The Lords of the respective Manors, Solicitors, Commissioners, Arbitrators, &c. &c. and the public at large, are evidently gainers thereby, without even the possibility of being otherwise;—but the present race of freeholders immediately concerned in the enclosure and improvement of poor wastes, owing to several *extravagant* and some *unnecessary* expenses, purchase these additions to their successors' estates, at too dear a price.

The Lords of the Manors, as if the wastes had remained in *statu quo*, retain all their mineral, and manerial rights and privileges, expressed in a long train of unintelligible terms of the feudal law; notwithstanding some show of words in the acts, alluding to *rights*, "*barred, destroyed, and extinguished*," by virtue of the respective divisions. The fact is, that not one single right was ever given up, save the lord's right to commonage of pasture, which was only a mere shadow, until the years 1796, and 1797; when the freeholders of the manors of Kedewain, Hopetown, Overgorddwr, and Kerry, thinking it a grievance that the lords should be entitled to all ores of metals, and fossil coal, that may at any future time be discovered within their respective allotments; agreed to give unto the lords of those respective manors one-thirteenth in lieu of one-fourteenth share of the wastes, as a compensation for their relinquishing their claims to fossil ores, metals, and coals. Unfortunately these manors are in a country, where, in all natural probability, no such minerals will ever be discovered. The freeholders might as well have purchased of the lords, the privilege of lobster-fishing on the summit of Pumlumon. The Flintshire lords have good reasons to be more tenacious of their rights in the mineral kingdom. The surface of that county is one extended sheet, covering immense treasures of lead, calamine, and coal; but, in that part of Montgomeryshire in question, any symptoms of such fossils might be deemed mere *lusus naturæ*.

There are various opinions respecting the speculative desideratum, called a "*General Act of Enclosure*.

Some theorists ask, "whether, in the present state of national opulence and population, the desired end might not more profitably be obtained, by a superior cultivation of the lands already enclosed? If a farmer," they say, "renting 1000 acres, has too small a capital, and too few hands, to cultivate such a tract as he ought, it would be deemed an imprudent act, and much to his own detriment, were he, in such circumstances, to add 300 acres more to his farm. When he sets about improving the 300 acres, a great part of the 1000 acres must lie neglected. The Agriculture of Britain," they add, "may be thought to be virtually represented by such farmer."

"*That we deny*," is the answer of the opposite party. "The observation might be just, if wastes, when allotted, divided, and put up to auction, found neither purchasers nor cultivation. But where has that been the case? Not in North Wales, it is clear. Because one farmer, or one set of farmers have not a sufficient capital, is that a proof that none such are to be found? Wherever wastes are divided and sold, they sell at high prices, for cultivation: a clear evidence that capital is not wanting. At the return of peace, if such a happy epoch we are ever to see, the discarded military may assist in removing one objection urged against a general enclosure, that is, want of hands: and universal industry, the parent of opulence, can in a few years double the national capital. Then, how infinitely more pleasing must the appearance of enclosures and plantations be to the eye of the speculative traveller, than the present dreary aspect of the forlorn wastes? The sterile heaths once clothed, will so influence the climate as to cause some alteration in the graduated scales of thermometers. The much deprecated diminution of wool is a mere chimæra: its quantity must be in direct proportion to the quantity of grass grown upon a stated number of acres, appropriated to the rearing of sheep: and lands enclosed, and cultivated, must produce more grass than those in their natural state. Tenants are apprehensive that such new enclosed lands will be too highly valued for the rearing of sheep: but together with the change in the rent of the land, and in the mode of cultivation, there should accordingly be an alteration in the system of rearing."

A third sect thinks all the foregoing arguments, on both sides, vain speculation; being confident that an Act for General Enclosure will never take place. But such an opinion savours of a libel against our Representatives in Parliament; as if senatorial patriotism were so languid as to sacrifice public good to private interest. If the annihilation of certain fees be thought an obstacle in the way of General Enclosure, let some equivalent be substituted, during the lives of the present claimants, and paid out of the national treasury. No class of society could object to such a proceeding, as it would ultimately promote the general weal. How unnatural it is to permit our peasants to emigrate into the wilds of Kentucky, in quest of that labour which is so much wanted on our own extensive wilds at home!

Progress of Enclosure, in the Six Counties, since the Year 1799.

In Anglesey, no public enclosures have as yet taken place: Two wastes, viz. Rhos yr pen Eglwys, and Bodfford, are now under survey. Talwrn Mawr, an extensive chain of connected wastes, intermixed with the old enclosures, and running through the greater part of the county, is likewise under investigation. On part of this waste tract the Anglesey Loyalists assembled previous to the battle of Beaumaris, in the year 1648.

2. In Caernarvonshire, Acts of Enclosure have of late been numerous. About the year 1803, an Act was obtained to enclose Rhos Hirwen, a waste of improveable soil, in Lleyn, consisting of about 3000 acres. It is inhabited by scores of cottagers, who have made encroachments thereon, and consider themselves as tenants in fee; so much so, that the opposition shewn by them has hitherto frustrated the execution of the Act. Upon this subject, a correspondent writes in the following terms.

" I confess I am no advocate for the enclosure of Rhos Hirwen. Its poor inhabitants support themselves by the fisheries on the coast, without being burdensome to the parishes; and are ready hands for the farmers in the labouring seasons. If these are ejected out of their residencies, which I find will be attempted, where will they remove to?—To the trading towns, navy, army, and particularly to America. The old and infirm must remain, and live upon the scanty allowance of the parishes. By thus enclosing, the landed proprietors will enlarge their bounds; but it will not conduce to add a handful of corn to the stock of provisions. There are here in Lleyn, in other parts of this county, and in Anglesey, many thousands of acres, not less I believe than two-thirds of the whole, lying in an uncultivated waste state. Were the proprietors to compel, or rather to encourage, their tenants to cultivate these already enclosed wastes, I am confident the produce would be much more than double what it is at present, both in corn and cattle, without any further enclosure of wastes."

This

This correspondent may be applauded by some for his humanity, and condemned by others as a narrow-sighted politician: but he is not singular in his opinion. A gentleman concerned in the Flintshire enclosures, speak thus—" I am sorry I ever consented to the enclosure of our hills: we have already almost put an end to our sheep-breeding. I think the question upon a General Act of Enclosure, is only for a statesman to answer."

3. Penmorva Marsh, noticed as a waste in the Survey of 1799, has been since embanked, and cultivated, in a very effectual manner, by W. A. Madocks, Esq. The same spirited improver, has also entered upon the embankment of the Traeth Mawr sands, which were vested in him by an Act of Parliament in the year 1808. (See p. 256.) The line of his embankment embraces a tract of about 2700 acres, to be redeemed from the domain of Neptune. These sands, in the Survey of 1799, were inadvertently included among the Meirionyddshire wastes; the uncertain bed of the Glaslyn river being the boundary of the two counties.

4. In the year 1806, an Act was obtained to enclose Morva Dinlle, (see p. 254) a waste situate in the parishes of Llandwrog, Llanwnda, and Llanfaglan.

5. In 1806, an Act was procured to enclose the waste lands in the parish of Llanddeiniolen; and another Act in 1808, " to amend and explain" the former Act. And these were followed by an Act for the enclosure of the wastes in the neighbouring parish of Llanrug. It is a pity, in the enclosure of hilly wastes, the cultivation only of which must be attended with heavy expenses, that a junction of opinions and interests among the freeholders does not take place, to avoid such pressure of costs. Here are three several

Acts procured to enclose the wastes in two parishes adjoining each other; the expenses of which, added to the Solicitors' fees, and the Commissioners' salaries, will nearly swallow up the fee-simple of the enclosed wastes. If the present rage for enclosing can be deemed a kind of fashionable delirium, these expenses are drugs that must act as powerful correctives.

In Meirionyddshire, Harlech Marsh, consisting of several hundred acres of level and sound soil, has been divided and enclosed.

Tywyn Marsh, noticed in 1799, together with an additional tract of sands, stretching along the beach towards Aberdyvi, making in the whole about 900 acres, have been enclosed under the powers of an Act passed in the year 1805; and in 1806 another Act was obtained, to enclose the waste called Gwyddel vynydd, in the same parish as Tywyn Marsh, and containing about 200 acres. Two separate Acts for 1100 acres!

In the schedule of enclosures in 1799 (p. 258), Denbighshire exhibited but 2100 acres of allotted wastes. A good deal of activity has been displayed since in the county, which will appear from the following particulars:

Names of Wastes enclosed in Denbighshire, since the Year 1799.	Date of the Act.	Lord of the Manor's Share.	Acreage.	Observations.
1. Callegva	1800	$\frac{1}{14}$	900	1. Good soil, and tillable.
2. Coed Marchan				2. Limestone grounds, and rocky.
3. Cevn coleyon				3. Tillable. Tithe free three years.
4. Denbigh Green, and	1802	$\frac{1}{16}$	2000	4. Excellent soil: crops of standing wheat in 1805, sold for 15 guineas per acre.
5. Henllan Wastes			6000	5. Soils various: some sound upon limestone, others heathy and peaty, in the Hills of Hiraethog, &c. Tithe-free two years.
6. Township of Ysgeibion, in the parish of Llanynys ..	1802	$\frac{1}{14}$	600	6. Hilly, but capable of tillage. Tithe-free three years.
7. Abergeleu ..	1808	—	—	7. Flat marshes, &c.

In Flintshire, they have added considerably to the amount of enclosed wastes, by the division and allotment of Mynydd Tegengl, in the parishes of Whitford and Ysgeiviog: and the proprietors within the franchise of Rhuddlan obtained an Act in 1807, for the enclosure of their portion of that rich marsh.

The freeholders are active, in several other parts of the district, in preparing Bills, and making surveys of the wastes: among others, are the following parishes—St. Asaph, in Flintshire; Bettws Abergeleu, in Denbighshire; Llangwm, Cerrig druidion, and Llanvihangel, in ditto and Meirionyddshire.

In Montgomeryshire, the townships of Origion and Winnington, part of them lying in Shropshire, have been enclosed, by common consent of the parties concerned. Other townships or manors in this county are preparing, and intend avoiding the expenses of applications to Parliament: such as Main, Dyffryn, Peniarth, and Teirtrev, in the parish of Meivod, containing about 1400 acres; Llannerchhudol, Tempster, and Trehelyg, near Welsh Pool, about 700 acres. And to lessen the expenses still farther, one Commissioner is appointed in lieu of two or three, as the case was formerly.

Upon a retrospect of the whole waste land enclosures in North Wales, there appears to be upwards of 90,000 acres, either completed, or in a progressive state.

	Acres.
Prior to the year 1775	3,000
From 1775 to 1790	10,000
From 1790 to 1800	50,000
From 1800 to 1809	30,000
	93,000

A great portion of these 93,000 acres is level, and capable of profitable cultivation: it were a disgrace, and a national loss, to have left them in their original, and comparatively unproductive, state. In other parts, the freeholders seem to have been actuated by what may be termed *excess of zeal:* their allotments are either too steep, or too near the clouds, to be brought under tillage;

: planting them with forest trees, adapted to the nd situation, is the only chance they have to being losers by enclosing. By planting exten-, the face of the country would, in a few years, onceivably improved; and the present generation thereby lay stock in the wooded funds of Cam- r the use of their posterity.

CHAP. XII.

IMPROVEMENTS IN GENERAL.

1. *Anglesey.*

THE landed proprietors of this county have laid the foundation of improvements in general, by their activity in the formation of roads, and by instituting an Agricultural Society.

In a county where improvements in tillage are seldom thought of, some more particular notice should be taken of the few which exist. The shore of the Menai, from Baron Hill to Maes y Porth, does credit to agriculture; but the greater part of the island exhibits a very wild landscape; excepting some few scattered farms, which are managed in a superior style. These appear as so many detached Tempés in the land of Cabul.

When the late Rev. H. Wynne Jones became possessed of his estate, in the year 1775, he lett Trev-Jorwerth farm, consisting of 229 acres, at the low rent of 40*l.* a year; allowing the land-tax also out of that small sum. The tenant complained that his farm was too dear. Mr. Jones took it under his own management; and having highly improved it, he lett it again for 200*l.* a year, net rent; to the mutual satisfaction of both landlord and tenant. The expense of clearing a piece of 33 acres of furze and stones, levelling old fences, and carrying soil upon rocky parts, amounted to 300*l.*; out of which a crop of barley, in the year 1795, sold at 36*s.* per quarter, repaid 270*l.*

Mr. Price, of Wern, is a very active improver; so much, indeed, that he may be said to buy land too dear. Upon two acres of a shallow peaty soil, upon a substratum of shale grouted in clay, he expended as under;

For cutting 305 roods of drains, piping, and re-filling the same, at 9½*d.* per rood	£12	1	5½
For raising, blasting, and carrying stones to the same, at 20¼*d.* per rood	26	1	0½
	£38	2	6

The average rent of land in Anglesey, at the date of this improvement, may have been about 7*s.* 6*d.* per acre; and supposing these two improved acres to be worth 10*s.* each, then the land was bought at 38 years purchase. The best application of such undrainable spots would be their conversion into plantations of aquatic trees. However, Mr. Price's improvements pay him better on other parts of his farm.

The Rev. Mr. Williams, of Bodavon, and several others, have quadrupled the value of their estates, by recent improvements. The annual profits accruing from some of them, amount to 30 per cent. upon the money expended.

Mr. John Rowlands, of Dyffryn, a tenant of Sir John Williams, of Bodelwyddan, is one of the few who take the advantage of having their farms under lease. One instance only shall be given of his improvements, made upon a piece of meadow land of eight acres. The soil was spongy peat, and clay; and so unproductive, that the crop of hay, in some particular years, was scarcely adequate to the expense of mowing. In the spring of 1792, it was drained, pared and burnt, and sown with turnips on the third furrow. In 1793 it was fallowed, limed at the rate of 240 bushels per acre, and sown with wheat, which produced ten returns. The remainder of the rotation cannot be so well approved: it was barley in 1794, barley again in 1795, giving nine returns; oats in 1796, with grass-seeds.

2. *Caernarvonshire.*

This county has been eminently fortunate in the acquisition of Mr. Madocks among its leading improvers. Indeed, his improvements are of such magnitude and variety, designed with such taste, and executed with such facility, that a minute report of them would appear, to those who have not personally visited the place, more like the reveries of romance than the narrative of genuine description. In harbours, embankments, canals, buildings, roads, plantations, and rural and commercial improvements in general, nothing less than a *Tre Madoc Guide* pamphlet can do justice to the founder.

The late Lord Penrhyn's improvements are noticed in the Sections on Leases, Plantations, Roads, &c.

Clearing the fields of vast nodules of trap, whinstone, quartz, and grey granite, is one of the most difficult processes of improvement in this county: quicklime, mixed in a certain proportion with, diminishes considerably the expense of blasting.

Expenses of Draining a Meadow of Twenty-four Acres, at Vaenol, near Bangor.

	£	s.	d.
160 roods of main drains, cutting and filling, at 2*s*. 6*d*. per rood	£20	0	0
1060 roods of wedged transverse drains, at 8*d*.	35	6	8
	£55	6	8

No part within the district stands in greater need of *draining* than a great tract of the Vale of Llanrwst. Between the town and the upper end of the vale, the soil is either gravelly, or a dry loam; and, consequently, a great part of it under tillage. From Trevriw to Caer Rhûn is almost a dead flat of rushy meadow ground, in the whole about three or four thousand acres; which, for want of draining, embanking, and other improvements, are not, in many places, worth above 6*s*. or 7*s*. an acre; whereas, were such operations performed, they might be made cheap at 30*s*. an acre. The proprietors are, for the most part, persons of the greatest property in the county. In some places, where there is a draught of the superfluous moisture, the soil is a productive loam. In others, the stagnant water has rendered it a perfect bog, partly peat, and partly clay; producing only a very scanty crop of short and sour hay, and that frequently carried off in bundles on horses' backs.

The silt brought up by the spring tides, and deposited on the margin of the river, has raised its bed above the hill-side of the vale; and conduced to render the meadows boggy. To bring them into a state of fertility, three things remain to be done.

First, an embankment, to keep out the tides, and land-floods; with sluices for occasional watering.

Secondly, a master-drain, cut the whole length of the marshy grounds, on the hill-side of the vale; and smaller collateral and transverse drains, at necessary distances; which would serve also as fences, and boundaries of property.

Thirdly, a ledge of rocks, called the *Arrow*[*], crossing the Conway about a furlong above Tal-y-Cavn Ferry, where the river is 238 feet wide, and 12 feet deep at low water, ought to be levelled. Below, the spring tides flow thirteen, and the neap tides seven feet; and that depth would be continued further up the river, were it not for this obstruction; over which there is a fall of three feet at low water. Cutting the rock to that depth, would be a great advantage to navigation; such vessels as draw six or seven feet water, might then go on to Trevriw, on neap tides: it would, moreover, by lowering the water three feet, assist materially in draining the meadows.

In the year 1783, Mr. Golborne brought in his estimate of the expense of levelling the Arrow, at 100*l.* It was then laid aside; but the proprietors of lands adjoining have lately entered into a subscription, and have contracted for the removal of the bar for 220*l.*

[*This obstacle to the navigation of the Conway has been partially removed.*]

3. *Denbighshire.*

Some parts of the Vale of Clwyd are almost in as bad a state, for want of outlets to the stagnant water, as those described in the Vale of Llanrwst. Much has been done in draining and embanking on Lord Bagot's estate, and by other proprietors; but still, much more land remains under its natural crops of rushes and other aquatics.

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[*] From *garw*, rough.

The Rev. R. B. Clough began his improvements upon Eriviat farm in the year 1792, and from that to 1797 he expended 100*l.* per annum, in fencing with quicksets, straightening hedges, stone-pipe draining, irrigating, and making reservoirs, &c. though he was only tenant at will.

He has since extended his improvements upon his late purchased estates, so considerably, as to pay about 50*l.* weekly to labourers and artificers. For his extensive and complete system of irrigating his meadow and pasture lands at Bathavarn, the Society for the Encouragement of Arts honoured him with a gold medal, in 1807.

Mr. Griffith of Garn, and several other gentlemen in this county, pursue the same spirited system of farming. Mr. Griffith has been at great expense in conveying a stream to irrigate his grass lands. An instance of his other improvements may be given upon a piece of 10 acres, a part of it being very springy, the other overrun with furze. The expenses of draining and ridding, two years rent and taxes included, amounted to 160*l.* In 1795, it was fallowed, manured with 514 cubic yards of lime compost, and sown with 25 bushels of wheat; produce 237½ bushels. In 1796, it was sown with 31¼ bushels of barley; produce 400 bushels.

The late John Wilkinson, Esq. had a farm of about 500 acres, at Brynbo, near Wrexham. The situation is bleak, and the soil naturally poor; being a hungry clay on a substratum of yellow rammel, or coal schist, which, in some places appears in the day. However, by good tillage, and manuring with lime, at the rate of ten tons per acre, it is so far improved, that the tithes of corn, within the township, have advanced 40*l.* a year in value; owing exclusively to his improvements. He had brought under cultivation 150 acres of wild heath, till then abounding only in springs and furze. A crowned head had assisted him in making his compost manures. Offa, king of Mercia, had employed men to bring together the soil; and Mr. Wilkinson went to the expense of lime, to be mixed with it. Large cavities, of the shape of inverted cones, were cut at convenient distances, in Offa's dyke, which runs across Brynbo farm. The cavities were filled up with limestone and coal, and then burnt in the same manner as the sod-kilns in the Vale of Clwyd.

4. *Flintshire.*

The improvements carried on by the gentlemen and farmers of this county, consisting chiefly of more judicious tillage, and manuring, are occasionally noticed in their more appropriate Sections. As to the farmers in the mining part of the county, lead and coal carriage, and lean horses, are too much their objects of attention, to permit them to devote much of their time to the employments of agriculture.

5. *Meirionyddshire.*

When Mr. Corbet became possessed of Ynysymaengwyn estate in the year 1782, the demesne land consisted of about 600 acres, whereof 261 were in the state of nature, a perfect turbary; and, exclusive of fuel, not worth above 9*d.* per acre. The practicability of redeeming such wastes, and the regular annual expense of buying hay to maintain a numerous stock, were sufficient stimuli to excite a person of meaner spirit than Mr. Corbet, to their improvement. The work was begun in the year 1788; and by the year 1794, he had made such a progress as to merit a gold medal from the Society for the Encouragement of Arts, and the applause of every person who beheld sterility succeeded by such luxuriant crops. The farm now produces annually, upon an average, about 500 tons of hay. The crops of the improved turbary are various, according to difference in their management, in manuring and watering, from one ton and an half, to two tons and an half per acre.

Expense of the Improvements.

Embanking 1980 yards, at 2*s.* 6*d.* per yard	£247	10	0
Do. 2310 yards, at 1*s.* 3*d.*	144	7	6
Draining 12452 yards, at 7½*d.*	389	2	6
Sundry other improvements	40	6	3
	£821	6	3
Value of 261 acres of unimproved turbary, at 9*d.* per acre	£9	15	9
Present value of 144½ acres, improved to be worth 30*s.* per acre	217	2	6
Do. of 116½ at 40*s.* per acre	233	0	0
	£450	2	6
Annual profit of the improvement	£440	6	9

Which is more than 50 *per cent.* per annum interest for the money expended.

Mr. Corbet still prosecutes his improvements, in the same manner, upon some additional tracts of turbary; and upon his allotments of waste land on Tywyn Marsh. Many of the poor of the country are invited by him to cut their fuel from his turbary wastes, upon condition that they cut to a certain depth, and leave the surface quite smooth, gradually sloping from the centre towards all points.

Tan y Bwlch House is situate in the centre of a most romantic woodland scene, aggrandized with bold rocks and hoarse cascades; and aloft, commanding a full prospect of the Valley of Festiniog, so much celebrated by Lord Lyttelton. The landscape had one imperfection: about 141 acres of the fore-ground were a dreary waste, covered only with a scanty crop of coarse grasses, and bog-myrtle; and subject to frequent inundations by land floods, as well as spring tides from Traeth Bychan. This one thing needful to complete the beauty of the valley, Mr. Oakeley has supplied, by forming an embankment to keep out the floods and tides; and by draining the intermediate space, so as to render the turbary soil capable of bearing abundant crops of hay and corn. In the year 1797, the improver was presented with a gold medal by the Society for the Encouragement of Arts.

Expense of the Improvements.

1423 yards of embankment, 36 feet in the base, three feet at the top, and nine feet high, at 19*s*. per rood	£169	2	9
106 roods of main drains, at 3*s*. per rood	15	18	0
550 roods of sod fences, planted with three rows of willow, and a foss on each side; at 2*s*. per rood..................	55	10	0
3885 roods of wedged drains, at 3*d*. per rood	48	11	
Levelling old pits, &c.	20	0	0
	£309	1	3

On Rûg demesne, the property of the late Colonel Salesbury, about 600*l*. were expended, in the years 1790 and 1791, in draining about 40 acres of peaty and clayey soil. The drains, in some places, required to be nine feet deep, insomuch that 3964 loads of stones were buried in draining eleven acres; and the ground was so spongy, as to require props to keep the drains open while in filling. Although the expenditure is here nearly the fee simple value of the land, yet, considering the swamp to be so near the house, the improvement was indispensable, had the expense amounted to double the sum.

Improvement on Traeth Mawr Marsh, by the late Sir Edward Lloyd.

An embankment formed to keep out the tide, made at first too frail to withstand the current, was consequently broken three successive times. A sufficient hint to enlarge the dimensions.

The present embankment is 20 yards wide at the base, and four yards deep, at one end; tapering to 16 yards at the base, and three yards deep at the other end; with valve sluices to drain the land-floods—63 roods at 22*s*. each—69*l*. 6*s*.

The land secured from salt water by this fence, letts for 15*l*. per annum; and considering it to be of little or of no value before, the improvement, although upon a small scale, was equal to the buying of land under five years purchase.

Ynys fawr farm, on the same marsh, has also been embanked by the same proprietor. About 50 years back, this tenement was lett, and dear enough, at 30*l*. but since the tide has been kept out, the present tenant is enabled to pay 200*l*. rent.

6. *Montgomeryshire.*

The improvements of this county consist, for the most part, in giving better tilth to the land, in manuring more abundantly, and in bringing the operation of the plough closer to the hedges. These indeed are almost become general; and several gentlemen, and spirited farmers, pursue the more expensive improvements of draining, watering, &c. upon a large scale.

The improvements of the late Mr. Bell Lloyd, of Bodvach, are already noticed. Those of another person of similar character, the late Arthur Blayney, Esq. of Gregynog, whose death this county has great cause to lament, must also be noticed. A stranger must have very little curiosity, if he could travel through *his* estates without enquiring, "Who is the proprietor?" The lands were under superior tillage; the farm-houses and offices were uncommonly neat and commodious; the fences, quick and flourishing; the occupiers happy, and generally, in good circumstances. The expense of an improvement was no object to him, when convinced of its utility. In the several articles of buildings, fences, drains, roads, plantations, ponds, pumps, and other conveniences for the accommodation of his tenants, he expended no less a sum than 20,000*l.* in the last seventeen years of his life; and that, without raising as much as one pound in his rental.

The spirit of improvement, gradually expanding, has visited some of the most inaccessible corners of the district, even Llanwddyn, a solitary recess, which a London *wit* would call the "fag end of the creation." The whole breadth of that valley, for some miles in length, consists of a very spongy peat soil, in the state of nature; and frequently overflowed by sudden torrents from the hills. Lewis Jones, Esq. of Cynon, embanked, and drained about 20 acres of it, in the years 1794 and 1795; and were the other proprietors to cooperate with him, in directing and deepening the bed of the Vyrnwy, which runs through the vale, the whole morass of about three miles in length, and three-quarters breadth, might be drained, so as to produce abundance of hay and pasture. The soil is rank and deep, in most parts of the slough.

SECT. I.—DRAINING.

This very necessary operation in farming, becomes more generally practised every year. Formerly, most of the drains were cut about 18 inches wide at the top, and about ten inches at the bottom; which was considered as a proper width for men to work *in* them, with ease and expedition. The quantity of stones necessary to fill these wide drains, rendered them too expensive when the carriage was from a distance; therefore narrow drains, from ten inches to a foot wide at top, and five inches at bottom, were readily adopted. These are cut by the men standing on the surface, and having long-handled spades, mattocks, and scoops for the purpose. When they are to be filled, small stones are poured in, topsy turvey, from a tumble cart. These narrow drains are more convenient when the issue of water is small, and the filling materials scanty: but where the issue is considerable and materials convenient, the wider drain should be preferred, as it must be more durable, being less subject to obstructions. Sometimes in these wider drains, the issue of water will be so copious as to require a pipe to be made in the bottom, of flattish stones; where the issue is less, the first layer, of good-sized round stones, is fixed by the hand, and then the remainder is filled promiscuously. This latter method is esteemed the most durable of any: it cannot be obstructed by the passing over of wheeled carriages, nor by the burrowing of moles.

Drains are sometimes filled with alder brushwood, furze, and such perishable materials.

Where no filling materials are at hand, the *wedged* drains, and the *shouldered* drains are used; but few soils and situations will suit them. The sods moulder, and moles obstruct the passage; neither will the sod-wedges, in strong soils, admit any filtration of the side water. In some places they are said to have lasted 15 or 20 years; in other places they have been opened, and filled with stones, in less than half that time.

Draining pipes, and draining tiles, are made of clunch, by Wm. Hancock, on Buckley Mountain, in Flintshire.

Where springs, properly so called, evidently appear, the draining of them is, in general, easily accomplished. But where a tract of land uniformly exhibits a chilled and oozy surface, producing carexes and other starved plants, it is a sure sign that clay is too near the surface to admit the absorption of the superfluous moisture: under-drains in such situations must be numerous, and filled to the surface with percolating materials, coarse gravel, &c. otherwise they cannot be of much service. Deep ploughing, copious liming, and every other means used to deepen the staple, by soil and dung composts, &c. will be more effectual to improve such land, even than draining. A piece of this description was observed to be ploughed for the first time so late as June, having been previously drained, and worked well during summer; the unreduced sods charred and spread before the seed-furrow. The manure was a compost of waste soil, lime unslaked, and the refuse of charcoal hearths, in regular layers; the charcoal assisting the lime in reducing the fresh soil to an homogeneous mass. This was carted, after being repeatedly turned, and spread upon the sod ashes. The situation was upland, and the farmer was laughed at for sowing wheat in land that was not worth above seven shillings per acre. He was recommended to sow rye, but he persisted in his intention, and upon nine acres he bestowed 17 bushels of wheat, being only three-fifths of the usual quantity of seed. The crop, in bulk, was as much as the land could bear; and the produce was extraordinary, soil and situation considered, being 187 bushels. The species of wheat was red Lammas. This kind of soil, well known by its produce of the carex panicea, centaury, blue-bottle, louse-wort, &c. when dried, either by draining, or augmenting the staple by deep ploughing, &c. is one of the most improveable of poor soils. It will, by the aid of manure, bear a longer course of tillage without running weedy, than any other.

In the enclosing of waste lands of this description, were large tracts divided into rhombs instead of squares, they might be more advantageously cultivated, especially in sideland situations. The ridges running parallel with the sides of the rhomb, would dispose of the surface-water by a gradual fall, so as not to carry down the soil and manure, which would be the case in forming the ridges parallel to the sides of a square field; and by endeavouring to avoid this evil, the ridges must run diagonally to the square, and of course be of irregular and inconvenient lengths. The ditch fences of a rhomb also, in such situations, would be more effectual as drains to carry off the oozing water which runs between the top-soil and clayey substratum, than those on the sides of a square can possibly be.

SECT. II.—PARING AND BURNING.

THIS practice is almost universally condemned by writers; and, upon that account, almost universally prohibited by landlords and their agents. But what Mr. Kirwan, in his Essay on Soils and Manures, says in its defence, seems, in the eye of sound reason and philosophy, to overbalance whatever has been urged against it. The evil attributed to its *use*, can only be applicable to its *abuse*. Quacks may deny the virtues of the most valuable medicines in the whole *Materia Medica*, because in imprudent hands they may be strong poisons. So paring and burning reduce coarse and useless grasses into the pabulum of a new succession of better herbage, and renovate diseased soils: but when the land is thus once brought to a state capable of fertility, the too common proceeding is, to sap its very essence of useful vegetation by raising successive crops, with careless tillage, no rest and little manure. This is the quackery that has brought the rational operation of paring and burning into such discredit.

One writer urges, that "it deprives the soil of its natural grasses." Very true: but if those natural grasses be good, no person will be foolish enough to destroy them; if not, why should they be preserved in preference to a better crop, which may be brought to succeed them? Another asserts, that it diminishes the soil at the extravagant rate of nineteen parts out of twenty; while Kirwan, and others, who have closely studied the theory and process of combustion, reduce the diminution to a mere trifle. Without attempting to decide, upon chemical points, where doctors disagree; be it sufficient here to state, that according to the opinions of the most experienced farmers in this district, it is the speediest and cheapest method of bringing coarse soils, over-run with fern, ling, gorse, mosses, and coarse herbage, under a course of tillage; and that it will not be necessary, nor perhaps proper, to repeat the operation. Upon coarse dry soils it is an excellent preparation for turnips; and there is scarcely any soil so poor, even in high elevations, but that by paring and burning it will produce a crop of rye, to be succeeded by a crop of turnips; which when consumed

upon

upon the land by sheep and cattle, will add cohesion to the soil, so as to produce successions of corn and grasses.

The usual time of paring is in May, that the sods may be burnt in June, before the nights lengthen, so as to render the process more difficult. The peasants say that peat, containing vegetable roots and fibres, do burn better, as fuel, when cut about the middle of May, sometimes sooner or later, according to the state of the Spring. They maintain the circulation of a vegetable juice in peat, which they call *nodd mawn*, analogous to the sap in trees; and that peat cut for fuel before this sap ascends, will not burn nearly as well in winter, though equally harvested. If this be true, it is the best time also to pare and burn for field manure. Peaty soils do contain gases that apparently ignite, in innumerable luminous sparkles, as soon as exposed to the air, by being cut in the night: whether this phosphated air is more copious during the supposed circulation of the *nodd mawn*, than at other times, they do not pretend to say.

In most places, the measure, by which labourers pare and burn, is called *'stang;* being somewhat more than two-thirds of a statute acre. Their pole, called a *quart*, is four square yards and an half, and 160 quarts make a 'stang. The paring was formerly done at 6*s*. a 'stang; it afterwards advanced to 10*s*. 6*d*., to 12*s*., and now, in some parts to 15*s*. or 16*s*. When the parers burn, they generally charge half price more; but they are apt, in burning, to collect too large heaps, for expedition sake, and thereby render the ashes more effete: therefore farmers, in general, take upon themselves the burning. The best method seems to be, to burn the sods in small heaps, continually smothering the fire; and as soon as the heap be of a proper size, and the upper sods moderately charred, to spread it immediately, without suffering it to cool; by which means both the carbon and the salts will be preserved for the soil.

The ashes of pared sods burnt in June, are frequently left in heaps, without being spread until seed-time in September, or later, when rye is sown. Sometimes the rye growing on the scites of these heaps will be a foot or more, taller than the surrounding crop. Writers say, that the fire dissipates every fertilizing quality in the ashes; but to what will they attribute this superiority in the crop; and that regularly over the whole field? To the scites being only covered by the effete ashes during the summer months?

A very injurious, but common practice, not to be tolerated, is that of paring the surface of waste lands, and burning it in large heaps, with such intense heat as frequently to convert clayey sods into perfect brick, and the remaining ashes into effete dust; to be carried into the adjoining fields. This practice ruins the wastes, without any apparent benefit to the enclosed lands.

SECT. III.—MANURING.

Kinds of Manures.

1. *SHELL SAND*.—This manure is found in different parts on the coasts of Caernarvonshire, and Anglesey; but the greatest fertilizer is that brought from *Traeth Coch*, or Red-Wharf Bay, in the North-east side of Anglesey. It contains about two-thirds, and from

that to four-fifths of decayed shells. The first time it was known to be used as a manure, was about the year 1645, by the Rev. Thomas Williams, Vicar of Llansadwrn*. Whether he tried it from his own speculation, or from hearing of its good effects in Devonshire and Cornwall, is not known. His neighbours, however, seeing his crops so much superior to their own, soon followed his example; but upon a small scale, for it was conveyed to the inland parts by horse-loads. It is now carried to the distance of ten or twelve miles in carts and waggons; and coastwise, and to the outskirts of Denbighshire and Flintshire in sloops. It is laid upon the surface about one inch thick; and if its good quality be not washed away by violent rains soon after it be spread, it will give fertility to the soil for ten or a dozen years. The greater the quantity of decayed muscle, and the smaller of cockle-shells, the sand contains, the better it is for manure. The reason of this preference seems to be, that muscle shells, being more frangible, are *sooner* reduced into lime in the soil; and consequently must have a quicker effect. Strong cockle shells require to be either ground or burnt, before they can be well incorporated with the soil. Cockles, fish, shell and all, have been applied as a manure with good success, on Aberkinsey Farm, occupied by the Dean of St. Asaph: and plenty of them is sometimes found on the coast, were farmers to embrace the opportunity.

Shell sand mixed with farm-yard dung, promotes its putrefaction; and the compost is a better manure, than either of them used separately.

The Rev. Mr. Wynne Jones, of Trev-Iorwerth, improved

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* Rowland's *Idea Agricultura*.

proved land that was in a state of nature, full of fern and of other rubbish, by laying on the sward from 240 to 260 bushels of Red-wharf sand, per acre. The freight, unloading, carriage, and spreading, amounted to 6*d.* per bushel, or from 6*l.* to 6*l.* 10*s.* per acre. The land was fallowed the following winter, and sown with black oats in March. The first crops did not repay him well, but the succeeding crops were more abundant: barley from four to five quarters; and oats from five to seven, and sometimes nine quarters, per acre.

2. *Sea Thong*, *(Alga Marina)*—And the fucus of various kinds, are collected in large quantities on the see coasts after storms, and spread on the fields, to be immediately ploughed in. Made into a compost, with soil, dung, and sand, they have produced the best crops of turnips ever seen in Anglesey. Both shell-sand and sea-weeds are preferred to lime, upon old tilled lands.

Sea-weeds were formerly burnt into *kelp* on the coasts, and sold in large quantities for the glass and linen manufactories; but now, the Scotch alkalies, owing to better management, are more pure, and consequently preferred.

3. *Marl.*—There are three kinds in Anglesey; red, grey, and white. Pits of the two former are known to be about 200 years old. The white marl at Llanddyfnan was not discovered until about the year 1652; when it was used by one of Cromwell's soldiers, who had settled in that part. It was afterwards, for many years, carried to remote distances. By degrees, either by the injudicious application of it, or by insatiable

crop-

cropping after it, like the operation of paring and burning, it has fallen into disrepute; insomuch that farmers can hardly be persuaded that it does not contain white arsenic, or some other latent poison. Mr. Rowlands had a different opinion of it in the year 1693, when he wrote his *Ideæ Agriculturæ*. "The plenty and excellency of the Llanddyfnan white marl, is one of the rarities that Anglesey may mostly boast of. It surpasses both lime and shells in the cheapness and efficacy of the improvement*."

Caernarvonshire has some marl on the coast of the Menai.

From Anglesey, the bed of marl, as the accompaniment of limestone, crosses into Flintshire; and through the whole length of the county, into Cheshire. In Flintshire, it is not out of credit, as in Anglesey. Clayey marl is the most abundant in the eastern part of the county; and the indurated kind about the centre, and in the neighbourhood of Flint. Edward Jones, Esq. of Weppra, pays for marl to as many of his tenants as have none upon their own farms.

Soil much reduced, by 18 years unvaried adherence to a particular rotation in tillage, has been found to recover its wonted fertility by *marling*†. The most general practice is to marl grass-lands for pasture and hay. It is laid on in June, after the first grass is fed off, and when the pits are most accessible. The quantity laid on an acre, is various, according to the quality of the marl, and the state of the soil; from 70 to 150 cubic yards. It is sometimes applied to land in tillage; but the more rational farmers call that practice, "*the abuse of marling*."

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* Preface to *Id. Agri.* p. 23.

† See page 154.

Mr. Wynne, of Ryton, had 39 acres of a light gravelly loam, upon which the crops of corn always lodged, owing to the looseness of the soil: by being marled at the expense of 8*l*. per acre, it became sufficiently cohesive. The part which was marled in June, produced good grass in a short time; and the whole was ploughed for oats the second spring.

Mr. Jones, of Weppra, erected a kiln, filled it with marl, and burnt it with wood, according to the method described by Mr. Arthur Young in his Irish Tour*. The ashes were spread upon about one-third part of a field, in June; and the pasture was grazed in autumn. The other two parts had been manured in the spring; one with farm-yard dung, the other with lime and soil compost: the burnt marl proved by far the most active manure. It caused grasses to vegetate that were uncommon to the soil before; especially white honeysuckle grass, red meadow trefoil, and tufted vetch: and the crop of hay, the following year, was so luxuriant, that the mowers insisted upon advance of wages per acre for cutting it.

4. A late whimsical writer † has expatiated much on the virtues of *coal;* and insists upon the necessity of substituting it as a general manure, instead of lime. This may appear a very wrong hypothesis to those who observe the general sterility of coal districts; but the foes of vegetation, in those parts, are the accompaniments of coal, clunch, rammel, sulphur, and generally a top-soil too retentive of water. *Sweet coal*, as the pure fossil, totally devoid of sulphur, is called when pulverized, is found by experience to be an ex-

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* Vol. 1. p. 224. Irish Edition.

† See Monthly Review, for June, 1798.

cellent top-dressing on grass lands. Mr. Wilkinson, at Brynbo, manured part of a field with *sweet coal-dust*, and the other part with a compost of soil and lime: the former produced the best and earliest grass.

5. Within convenient distance of the limestone range, which is traced, in the Section on Minerals and Fossils, from Alberbury, in Shropshire, to Anglesey; *lime* has, for some years back, become the most general manure.

In Anglesey, the Rev. Mr. Wynne Jones found it the speediest and most effectual of all manures, in bringing coarse lay-grounds under tillage. First of all, he pared the surface; and instead of burning the sods in the common way, he mixed them with quicklime*.

Mr. Price, of Wern, limed a summer-fallow in 1796, at the rate of 75 quarters per acre; but either the quantity was too great, or the limestone contained too much iron and quartz in its composition; for the crop of wheat in 1797 had entirely failed, on some patches of several square yards each. The lime, in several parts, had formed a crust, like a mortar floor, a few inches beneath the surface of the soil. Twenty-five quarters is a common allowance per acre, in Anglesey.

In Flintshire and Denbighshire, lime is commonly burnt, in sod-kilns, on the field to be manured. The expense of making the kiln, raising and carrying the stones, fuel, mixing the charred sods and lime, carrying out and spreading, generally amounts to from 4*l.* 10*s.* to 5*l.* per acre.

Gwerclas, and Havod, rocks, near Corwen, are the only places in Meirionyddshire which produce white lime. The quantity burnt there annually may be about 50,000 bushels.

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* See the account of Kilken Enclosures, in Chap. XI. on *Wastes*.

Lime is carried into Montgomeryshire, from Porthywaen and Llanymynech rocks, on the confines of Shropshire, to the distance of 30 or 40 miles; where it costs the farmer from 30*s*. to 40*s*. per ton. Since the Montgomeryshire Canal has been made, limestone and coal are conveyed thereon as far as Welsh Pool, Berriew, and other places, where about 25 perpetual kilns have been erected on the wharfs, turning out, when fully employed, from 400 to 600 bushels of lime each, per day.

The distance of the materials being so great, overliming is an evil that can scarcely befal the Montgomeryshire soils. When lime was first used there as manure, about 60 years back, and carried several miles on horseback to meet the farmers' carts from the uplands, it must have been sparingly bestowed. The term *hau-catch* (to sow lime), still preserved in some parts, is expressive of a scanty allowance. However, it may be presumed, from the rapid progress of liming, that the farmers found the benefit of the practice.

Some few decline the use of lime, being, as they say, convinced that it does not promote fertility. One farmer says—"Chemists have discovered that lime has different properties; and that there is a kind of it injurious to vegetation. Whether our lime is of that sort, I know not; but in the course of my practice, I have not been able to discover any advantages arising from the use of it, adequate to the expense of procuring it. The scourings of our ditches is a sort of brown marl: quicklime mixed with it, pulverizes it, and soon brings it fit for use, as manure for wheat. But I am of opinion that a longer exposure to the air, and frequent turnings, would answer the purpose as well. Lime, as manure upon the grass lands, is almost worse than nothing." The limestone here in question, has not the least appearance of foreign ingredients; its lime not promoting fertility, may be owing to the soil being already somewhat calcareous, having marl for its substratum. The virtues of lime cannot be conspicuous, but in soils totally deficient in calcareous matter, such as most of the Montgomeryshire soils, in their natural state. To this may be attributed, why from 70 to 80 bushels per acre, the customary allowance in Montgomeryshire, produces greater effect than treble that quantity upon lands in the vicinity of the Anglesey or Flintshire lime-kilns; where the soils already contain a certain portion of calcareous admixture. Calcareous soils are evidently warmer than those which are destitute of lime; and, consequently, grain ripens earlier upon them. To liming, and to more timely sowing, may be attributed the present less difference in time between the corn harvest in the uplands and lowlands of this district. Formerly, men from the lowlands went to the Shropshire harvest, and others from the uplands came down to the lowlands; and both parties could return in time to cut their own corn: but now, some years back, the ripening of grain is more upon an equality within the three tracts than formerly, when lime was not in general use; the men are therefore detained at home, and an advance of wages, in the lowlands, has been the natural consequence.

In Montgomeryshire, some farmers give only about 50 bushels; but the general average is about 75 bushels to the acre; though there are instances of from 100 to 110 bushels having been applied to summer-fallows, per acre, without any other manure; and the crops of wheat abundant. An instance occurred of 75 bushels per acre being given to wheat, and 75 more to the succeeding barley crop, which failed; but the same grain being sown again the third year, it succeeded so as to produce 44 bushels per acre, upon a soil not reckoned favourable to the growth of barley. The failure of the second crop was attributed, in this tract of moderate liming, to a superabundant quantity; but other causes may be assigned: the soil, upon a dry season, was naturally inclined to harden too much, and the lime had not its proper effect upon it, so as to diminish its cohesive quality, until the second year.

The Denbighshire and Flintshire method of mixing lime with headland soil, clearings of ponds, roads, drains, &c. was not practised in Montgomeryshire until within some few years. It seems far preferable, where practicable, to the spreading of pure lime; as much less goes to waste, and it cannot possibly be so much carbonated. Where lime is to be spread pure, it is laid in large heaps of several loads together; and the carbonated surface is restored to its efflorescent state, on being mixed with the internal quicklime, in turning the heap. Otherwise, when heaps are too long exposed to the air, and in small quantities, in the process of turning, the internal heat is not sufficient to expel the carbonic acid of the crusted surface; and when spread in that state, it is a question whether the carbonated part can be of better service to the soil than an equal quantity of lime, gravel, or shale; as it is found to be ploughed up, after several years, in as entire a state as it was first ploughed in. An intimate mixture of the powder of lime with the soil seems necessary, to render the latter properly calcareous; and this cannot be as well effected as by mixing the clod-lime with soil as soon as it is unloaded, or by spreading it in its most efflorescent state, and harrowing it in well. But the most common practice is, to spread the lime upon a fallow in August, and leave it upon the surface a month or six weeks, to be harrowed in before the seed furrow. If heavy rains fall soon after the spreading of the lime, its lixivium*, as the farmers call it, is reckoned to have the most powerful effect: but by this method, much of the lime must necessarily be carbonated; which, if it has any effect at all upon the soil, must be much slower than when it is intimately mixed.

In the breaking up of fresh and coarse lands, lime seems to be of the greatest service; and should be given, for the first time, abundantly. Farmers should never consider lime as the food or nourishment of plants, but as the alterative medicament of the soil; never to be used but when Nature required it: either to dissolve noxious combinations, and to form new ones; to bind loose soils; to diminish an over-abundant cohesion; or to reduce the inactive vegetable fibre into fertile mould. For such purposes, there is not, perhaps, a more valuable article in the whole agricultural pharmacopœia. Some farmers, unaccustomed to reflect upon these subjects, when lime has once excited into action the dormant powers of vegetation in the soil, and good crops succeed for a year or two; draw from thence false conclusions, and continue liming, and tilling, until their lands produce more weeds than corn. There is an analogy between the treatment suitable to the animal and vegetable creation. When medicines have removed the cause of their application, they are discontinued; and the patient, rendered weaker by

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* *Lleisw calch.*

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their operation, requires some revigorating aliment; in like manner, after an effectual liming, the soluble carbon of rotten dung, or some such restorative, should be applied to the soil, to replenish it with what it may have been robbed of by the action of lime.

6. *Farm-yard Dung.*—Before the revival of agriculture, this was the general manure; and is still to be ranked in the first class. Where improved farm-yards have been constructed, the means of increasing its quantity, and preserving its quality, are attended to: in many other places, neither of these points are deemed worthy of the farmer's care. A year's store of dung, as well as a year's store of hay, is by some persons considered as essential to profitable farming. To be ploughed in under the furrow, it is always preferred in a state of complete putrefaction; but upon grass lands, several farmers, during the winter, and early in the spring, carry it out fresh, or in its fermenting state, before putrefaction has made much progress. When left to putrify, it is applied to the meadow lands as soon as they are cleared of the crops of hay. Soils manured with dung the preceding year, give more profitable crops of wheat than when applied immediately before sowing. Some tenants are prohibited by their leases from bestowing any dung upon their lands in tillage, excepting for green crops. The quantity bestowed per acre, varies, according to circumstances, from five to fifteen and twenty tons, or loads. It varies in value according to the varieties of food of cattle. It is of a lighter or brown colour, where the stock is fed with upland or rossy hay. Winter green fodder, turnips, cabbages, &c. add much to its quality.

Dunghills should be well covered, when carted into the fields, as well as in the fold, to prevent, as much as possible, the escape of gases, formed and combined, during the processes of fermentation and putrefaction, in the state of volatile alkali.

SECT. IV.—WEEDING.

WEEDS seem to have got so permanent a footing in many parts of the district, that common farmers do not think it worth their trouble to meddle with them; and so leave them in the undisturbed possession of their fields, from generation to generation. There are many who manure their lands rather plentifully; but their negligence in not clearing them of weeds, renders that operation, in a great degree, useless: soil should be cleaned *first*, and *then* manured.

Small weeding-hooks, and wooden forks, are the implements chiefly used to cut thistles and dock in corn; which is done sometimes by the day, at other times by the acre: but the best method of weeding, or rather, the best mode of preventing weeds, is by fallowing, hoeing, and abstaining from exhausting the soil. A dry March is one of the best seasons for weeding dock, &c. out of wheat crops. Treading the wheat will then be of service, which at a later period would be injurious. Then, the dock which lay upon the surface since seed-time, begin to take root; and might be easily picked up, even by children.

On pastures, thistles are found to be more effectually destroyed, by permitting them to attain their full bloom before they are cut; when the stalks become hollow.

If dock be chopt off with a hoe, just below the surface

face of the soil, in June; and if the operation be repeated as soon as the second shoot appears, the root is found to decay; and instead of germinating the third time, will add richness to the soil. In opposition to this method, some say that the best way of getting rid of dock, in pastures, is by not cutting them at all: others use pincers, or a pronged lever, and take them up by the roots.

Butter-bur *(hybrida)*, and other plants of the *tussilago* class, common in gravelly loams, have been attempted to be bled to death by being repeatedly bruised with sticks, when in their most succulent state.

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SECT. V.—WATERING.

THE effect of the fertilizing stream upon grass lands, has been known in some parts of this district, from time immemorial: but no regard was paid to system. The farmer turned the water into his meadow, in the same careless manner as he was wont to turn in his horse: both were only let in at the gate, and then left to chance and natural propensity. However, even this much was sufficient to shew what might be done. Were men to observe Nature, they would not be long blind to the advantages of irrigation. Nature has delivered her lectures on the subject ever since the creation. Wherever the least rill wanders casually over the mead, there follow an earlier verdure, and more luxuriant herbage.

The late Mr. Lovett, of Chirk, claimed the merit of having first introduced systematical watering into North Wales; for which purpose he hired professed irrigators from South Cerney, in Gloucestershire; who floated 60 acres of his grass lands with a stream from the river Ceiriog. The men, Portlock and Harrison, pursued the same operation, on the Rev. Mr. Wright's plans, on several hundred acres within the counties of Denbigh, Flint, and Montgomery; at the average expense of 4*l*. 10*s*. per acre.

Mr. Corbet also introduced the system of watering into Meirionyddshire, upon his own estate at Ynysymaengwyn; and upon so large a scale, that he had 400 acres annually and regularly irrigated. He grazed most of his watered-meadows until the 1st of June, which were afterwards kept for hay, and mowed in the beginning of August; and then the aftermath was commonly abundant. Pursuing a different method, Mr. Lovett did not graze his meadows in the spring, but mowed an early crop in June, or the beginning of July; and, of course, as a compensation for the loss of spring feeding, had a more copious aftermath. The crops of hay, by both methods, were, upon an average, from one ton and a half to two tons and a half per acre. Mr. Corbet valued his spring feeding at 20*s*. per acre; but which of the two is the most profitable proceeding, is a point in question.

Mr. Wynne, of Ryton, has procured near three tons of hay per acre, from watered-meadow land on the Dee; and has converted his marl-pits into reservoirs of water for irrigation. The pits are all connected together by means of covered pipes; so that the contents of the whole, or less, as occasion requires, may be discharged over any particular piece.

Not a rill, containing the first downfall of rains in autumn, should be permitted to pass uselessly along its natural channel; but, being enriched with the whole summer's manure of the hills, and the strainings of the careless farmer's farm-yard, it should be led to deposit its treasure, as a sediment, on the adjacent lands; and would be found a greater fertilizer than three subsequent irrigations, further on in winter, when the troubled stream is impregnated with inferior substances.

Since the year 1799, watering has become ten times more general. Land-owners in Caernarvonshire have introduced professional improvers into the country, who advertised an offer of their services in draining, irrigating, &c. and met with due encouragement. The labourers of Messrs. Rome and Payne, like those of their predecessors, Portlock and Harrison in the three eastern counties, will soon steal the art of levelling, and practise it far and wide through the western counties. In those of Denbigh, Flint, and Montgomery, scarcely a rill, at present, escapes the farmer's attention. Many a stream, formerly unheeded, may now, very appropriately, be styled *Esek*, or the *water of contention*[*]; because of its being the subject of strife between two or three rival irrigators. Farmers are more easily convinced of the benefit of watering than of any other improvement: the effect is strikingly obvious, and the means of obtaining it is comparatively cheap. But several of them run headlong into the practice, without having previously levelled their grounds. As they are as yet but novices in the art, it is to be expected they will soon see their error, by the inferiority of their own crops in comparison with those of their neighbours, who have their lands well prepared to receive the fertilizing stream.

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[*] See Genesis, xxvi. 20.

The strainings of a farm-yard having for ages been permitted to glide uselessly into an adjoining dingle, and then down the Severn, the occupier of the farm conducted it into a reservoir; but the quantity being too small, as well as too inspissated, for the purpose of irrigation, and no stream being near above the level, he cut several surface-drains in a wet waste adjoining, and conducted the poor water from clay and peat into the reservoir. He then opened the sluices, and turned the mixture over a poor meadow of shallow soil upon clay, usually producing only a very scanty crop, mixed with a dwarf heath *(erica)*. The first year's alteration was extraordinary. The crop of luxuriant grasses was immense, and nearly as tall as wheat. When the auxiliary water was not wanted for the reservoir, it was occasionally turned over another part of the meadow, which was out of the reach of the mixture; but its effect was scarcely perceptible. However, some persons declare, and they say from experience also, that even this kind of poor water, though it may not answer expectation for the three or four first years;—yet if irrigation be persisted in, annually and systematically, it will at last have the desired effect. But the question is, whether the expense will not overbalance the profit at last? It seems more probable, that poor water and poor soil can produce nothing but poverty.

Farmers are directed to judge the fertilizing quality of a stream, by the vegetables growing on its margin; to prefer that which produces cresses, brooklime, &c. to another which nourishes only rushes, mosses, spearwort, &c. Water also issuing from lime-rocks, and shale, must be superior to that which proceeds from slate and granite rocks. In the hills near Machynllaeth, where no limestone is found, a stream of water issuing from an argillaceous rock, was observed to deposit calcareous incrustations; and where it casually overflowed, the herbage was, in a remarkable degree, superior to that on the adjoining grounds, though the soil was the same; and being waste land, it was always kept bare by the depasturing stock.

Dr. Darwin, in his Phytologia, comments upon the superior qualities of *spring* water in irrigation. This is obviously owing to its higher degree of temperature. But where can a sufficient quantity be found;—in the moon? This recommendation is similar to that of another writer, who recommended canary-seed to be sown by farmers in general, as the most profitable of all crops.

The system of watering chiefly adopted in this district, is that published by the Rev. Mr. Wright, of South Cerney; and called *catch-work*. Few or none have previously ridged their lands, in order to pursue Mr. Boswell's *floating* method. The *diagonal* mode of irrigation, described by Mr. Young, in his Farmer's Calendar, is a great improvement upon the old *catch* plans, and cannot fail of being readily adopted.

CHAP. XIII.

LIVE STOCK.

SECT. I.—CATTLE.

THE staple exports of Anglesey are copper and live stock. Roberts, in his Map of Commerce, published about 1649, says, that the island sent then to the English market about 3000 head of cattle, annually. Mr. Lewis Morris, in his Book of Charts, in 1747, exaggerates the number to 15,000; and subsequent writers have reduced it to 10,000: but it may be asserted, from a good source of information, that the average annual export is not above 8000 head, from one to four years old; which in the year 1797 may have been sold at, or near, the following prices*:

900 yearlings, mostly heifers,	at 4*l*. 10*s*. each	£4050
2100 two-years old,	at 8*l*. 8*s*.	17,240
5000 three-years old,	at 11*l*.	55,000
8000		£76,290

When numerous herds are bought in the island, for the English markets, they are compelled to swim, in droves, across the Strait of the Menai; and although numbers of the weaker sort are sometimes swept down by the force of the current, for some miles, yet losses seldom or never happen.

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* In September 1801, when cattle were at the very highest price, the above number, and of the above description, would have sold for about 20,000*l*. more than in the year 1797. A barometer is scarcely more variable than the value of live stock, &c.

Wherever the *rearing* of cattle is the chief object of the farmer, the articles of the dairy are of course neglected. Calves are not weaned in Anglesey until they be double the age at which they are commonly weaned in other counties. This, together with their not being gelt until they be about a year old, accounts for their bull-like features in the head and dewlap; but it is a received opinion, that they are hardier on that account, and may be kept on coarser pasture.

The characteristics of a choice Anglesey runt, agree in most points with those of a Roman ox, as described by Columella:—coal-black colour, with white appendages;—remarkably broad ribs;—high and wide hips;—deep chest;—large dewlap;—flat face;—and long horns, turning upwards. Mr. Bakewell thought, that in some points they were nearer his idea of perfection in shape, than any other he ever saw; *his own* improved breed excepted. Some farmers aspiring at a select stock, by having their he-calves gelt under their dams, their horns become of a yellower colour, longer, and finer, than common; and, upon the whole, nearer the present idea of symmetry.

The average weight of their quarters, when fat, at three or four years old, is from eight to eleven score pounds. One farmer, having 25 working oxen always upon his farm, kept some of them until they were eight or nine years old, when they would weigh, fat, from 13 to 15 score per quarter; and would have sold, according to the price of 1797, from 40*l.* to 50*l.* a pair. Some of the first breeders think the high and wide hips of their cattle upon the decline; and consequently, intend to cross the breed with foreign bulls, for the sake of recovering that valuable characteristic.

The promontory of Lleyn and Evionydd, in Caernarvonshire, having the same kind of undulated surface, though not altogether so good a soil, as Anglesey; has likewise a breed of cattle similar in several of their characteristics. From this part of the district, the consumption of England is annually supplied with about

1500 yearlings, which in 1797 may have been sold at 4*l*. each	£6000
4500 two-years old, and upwards, at 9*l*. each	40,500
	£46,500

The cattle, in the remaining part of Caernarvonshire, and in the whole of the county of Meirionydd, some few select stocks excepted, seem to be diminutives of the above breeds of Anglesey, Lleyn, and Evionydd; having nothing to recommend them, save their extreme hardiness, and consequent cheapness of rearing. The highlands of the counties of Denbigh and Montgomery, abound with the same puny race. In the vales, and in the county of Flint, the cattle are of a superior kind, larger, and of all varieties of colours.

The natives of the sea-coast from Abergeleu to Holywell, and thence along the Dee towards Cheshire, are reckoned very quick feeders. As an instance of it, a gentleman from that quarter, having worked his oxen until he had finished turnip-sowing in June 1784, sold a pair of them to a neighbouring grazier for 25*l*. supposed to be near the market price. These, without th aid of any other luxury than rest from labour an plenty of grass, were so increased in bulk by Decemb follo following, as to have their beef sold for upwards of double their prime cost. The particulars of their comparative weights, when lean and when fat, could not be procured.

Another pair of oxen, reared on Bod-Tryddan farm, in the same neighbourhood, were worked until the end of the sowing season in October; then fed with grass, cabbages, turnips, and mixed meal of pease, beans, and oats; and sold the following March for 62 guineas; the best of the two weighing a ton.

A grazier of good judgment and great experience, prefers the Montgomeryshire cattle, from the vales of the Severn and Vyrnwy, to any other breeds in Wales. According to his opinion, they collect bulk on the more valuable parts, and have less offal than those of Shropshire. About nine months' feeding, with grass, hay, and turnips, will add about threescore pounds weight to each of their quarters. Cow beef, when fat, will weigh from seven to ten score pounds per quarter. The real breed of the county, are the brinded, finch-backed, and short-legged kind. Another, which has of late become very numerous in the Severn Vale, are the long-legged, light brown colour without any mixture, and smoky or dun faces; said to have come originally from Devonshire. They do not seem superior, in any particular, to the original Montgomeryshire breed, excepting that long-legged oxen are better adapted for the chains.

The Herefords, with white faces, are now becoming very general.

Oil-cake is found by experience to be a great promoter of quick feeding. Those who use it, have their cattle ready for the market a month sooner than their neighbours; but they are under the necessity of keeping

ing it a secret, owing to the prejudice of some people against beef fed in that manner; who, nevertheless, when they eat it unknown, cannot but allow it to be deliciously good. The cake is generally given pounded, with pease-meal, and tailings of corn. Its chief excellence is its laxative and cooling quality, preserving the cattle always hide-loose. No manure is found to be a stronger stimulant of vegetation, than the dung of cattle fed upon it. The Irish cake is thought preferable to the English; and is delivered at Chester and Liverpool at 6*l*. 10*s*. per ton. One grazier bought 43 tons of it in the year 1796, at that rate. Since that period, the price has so much advanced, that the use of oil-cake is nearly relinquished.

The cooler cattle are kept while fatting, the better; provided their backs be dry. So also, indeed, are all kinds of beasts. Cows are supposed to be more subject to cast their calves, when housed in too close buildings. Mr. Wynne, of Ryton, could not attribute the loss of 28 calves out of 90, in one year, to any other cause: for when the supposed cause was removed, by opening avenues for currents of air, the effect ceased; and the loss in the following year (1707), was reduced to two calves out of one hundred. Too rank grass; hay from flooded lands; damaged hay and straw, in wet harvests; are likewise supposed to produce the same effect as the mephitic air of too close buildings.

DAIRY.

It is acknowledged as a general rule, that the greater the quantity, the worse is the quality of a cow's milk. Hence the disrepute of the Holderness breed, although they give from 14 to 16 quarts at a time. Calves are known to have forsaken their own dams, and to have gone as it were by instinct to others, whose milk was of richer quality. Two calves upon a particular cow, have fed more than one calf upon another kind of cow, which had equal, if not a greater quantity of milk. Cows give different quantities of milk, according to their respective breeds, and quality of their food, from five to fourteen quarts. Those who do not give above five quarts, generally manifest a greater disposition to fatting than milking; and should not be kept a week longer upon a dairy farm.

A Flintshire cow, at Mostyn, of the true lean milking breed, from May 1st to October 30th, both inclusive, gave 4026 quarts of milk, which produced 358 pounds avoirdupois of butter, being nearly equal to two pounds per day; and 22 quarts of milk per day, for 183 days successively.

In Anglesey, and other rearing parts of the district, the dairies hardly supply the call of home consumption. In other hilly parts, great quantities of butter, of an excellent quality, are made, and sent to the different fairs, at Chester, Shrewsbury, and Bridgnorth; and by sea to Liverpool. About three tons per week are sent to Chester, during the six summer months, from the neighbourhood of Bala, in Meirionyddshire; besides a supply to Denbigh, Holywell, and other weekly markets.

The peculiar flavour of tub-butter, which is disagreeable to delicate palates, is sometimes corrected by the addition of nitre and sugar to common salt, in the seasoning; according to the direction of a well known recipe. The rancidity of the milk of cows fed on turnips, may also be cured by adding nitre to the new milk; or prevented in part, by straining the new milk into vessels dipped in boiling water.

But the manufacture of good cheese, is a process, to the knowledge of which the dairy-maids of Mona and Mervinia have not yet attained. To supply the defect of butter, of which the milk is robbed, they saturate the curds with rennet, in such a manner that the cheese made therefrom is as spongy as the *fungus arboreus*. And if they have no nice feeling in their fingers, they ought to be taught the use of a thermometer, to judge the proper temperature of milk, when the rennet is to be applied. But many of the labouring poor prefer such strong tasted cheese, because, according to their expression, "it eats bread;" and consequently they are supplied with several tons of it annually, from the cheese fair at Dolgelleu. However, as a proof that the fault lies not entirely in either soil or climate, the dairy-maid at Nannau imitates all the varieties of English cheese, with good success. Cheese is also made at Hirdrev in Lleyn, scarcely inferior to any in Cheshire; and the dairy-maid has been initiated into the art in that county. In the lowlands of Denbighshire, Flintshire, and Montgomeryshire, they imitate the Cheshire, and some few the Gloucester, cheese making, so as to be sold respectively as such: and dairy-maids, being hired from thence, by gentlemen farmers, into the other parts of the district, will soon render the art better, and more extensively known. Old pastures upon loamy soils, are always preferred, both for fatting cattle and making butter and cheese. Some assert that a good dairy-maid will make good cheese, independently of the quality of soil or grass: but this is not an article in the creed of common sense. Some soils are said to produce herbs either too acid or too alkaline; and that the milk of cows feeding thereon has a quality unfavourable to the operation of the rennet. By rennet is here meant, not the contents of a calf's maw, or stomach, but the maw itself, well cleaned, salted and dried. Anatto is used in the lowlands, as a colouring; but seldom in the uplands.

Pliny says, (lib. xi. c. 42), that the cheese of Gaul tasted aromatic. In some parts of this district, aromatic herbs are used in cheese for home consumption. Some are made checquered, or tesselated, of various colours; sage being the chief ingredient in one lozenge, and marigold in the other.

The largest dairy within the whole district, is that of Mr. Wynne's, of Ryton. From an average of 95 milch kine in profit, he makes, one year with the other, 14½ tons of cheese; which in the years 1794, 1795, and 1796, were sold for the several advancing prices of 3*l.*, 3*l.* 2*s.*, and 3*l.* 3*s.* per cwt.; amounting to the respective sums of 870*l.*, 899*l.*, and 913*l.* 10*s.**: which must afford good profit from a farm of 455 acres; exclusive of butter for the use of the family, rearing of stock, and a great number of those acres also under tillage.

Cows commonly continue profitable milkers for eight or ten years. One extraordinary fact occurred in Mr. Wynne's dairy; three cows calved at one birth, continued, in his own possession, to give milk in abundance, until they were each 18 years old.

When cows are dried for fatting, it is not done altogether at once, but gradually, to prevent suppuration in the udder. They are also generally bled, and a dose or two of allum, in their own milk, is given them.

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* Such is the advance of cheese since 1796, that the usual produce of this dairy, would have sold, the last years, for 1065*l.* at three guineas and an half per cwt.

OXEN.

OXEN.

The high price of cattle, and the reverse of horses, previous to the year 1798, with the addition of heavy duty, biassed the public a little in favour of ox-teams. Oxen inured to labour, according to the opinion of some graziers, are much more profitable than others, to those who purchase them for fatting. This they account for, by a change in the animal economy, arising from sudden rest, and superior keep; which others, under different circumstances, cannot experience in an equal degree. The deep-chested and short-legged oxen, such as those of Anglesey, are highly recommendable for their capacity of collecting bulk, while feeding: but for the plough, they should be longer legged, which would adapt them to easier and quicker pacing. Bull segs, gelt in their fourth year, are much stronger in the loins than other oxen; and not so much given to hang out their tongues by working in sultry weather. Oxen for the team are always shod; and that commonly by being cast; but sometimes in slings. It has been proposed, to initiate them from their calfhood in the practice of giving up their hoofs; and then they might be shod as horses are. Or, they might be hardened gradually, by being worked two or three days, or more, until their hoofs get sore, then permitted to rest for some days; then worked again; until by degrees, after frequent repetitions of such alternate labour and rest, their feet become callous enough for any road. In the chains, they are generally *yoked;* and worked from three to six, and some to seven, eight, or nine years old. Some few draw them in collars, like horses; which they suppose to be the best method.

The docility, and of course the chief utility, of the ox, depend in a great degree upon the treatment he receives when he is initiated into the chains. The farmer who has peevish, passionate, and unfeeling servants, can hardly expect to have kind-working oxen. The Duke de Vendôme, having frequently enquired into the cause of the quarrels between the mules and the muleteers; said, that to the disgrace of human nature, he always found *reason* on the side of the mules. The sarcasm is still applicable, when by comparing our most valuable beasts of labour with their drivers, we so frequently find the former the more rational animals. Seeing the human heart capable of such insensibility, might have been one cause why Diogenes became a cynic; and may still be sufficient to make even a Howard a convert to misanthropy.

Several breeds of cattle have at different times been introduced into the district.

The late Sir John Wynn, of Glynllifon, brought both bulls and cows, of the best kinds in England, into the western coasts of Caernarvonshire; which by crossing, much improved the breed of the country. Since that time, the Rev. Mr. Ellis, of Llanystymdwy, and others, followed the same plan: but experience proves, that difference of climate, and of quality of pasture, will at length dwindle the mixed breed, after repeated crossings, nearly to the original native size.

An experienced breeder, having tried every sort, from the camel-like Holderness to the puny Alderney, is of opinion, that the kind of cattle best adapted to the vallies in Wales, is a cross between the Lancashire and Leicestershire breeds.—"They endure," says he, "the winter without being housed; milk exceedingly well; and when dry, become very soon fat. If Mr. Bakewell

well was a judge, (and a perfect one in sheep and cattle he most certainly was), there happens to be the strongest proof, that he was of the same opinion, from the following fact:—When Mr. Corbet, in the year 1772, hired Dr. Taylor, of Ashbourn's bull, bred from a Lancashire bull and a Leicestershire cow, Mr. Bakewell desired he might send his two best heifers to him."

That a cross between the Lancashire and Leicestershire, or what is commonly called Bakewell's breed, "will soon get fat;" will not, and cannot, be disputed; in that consists their excellence: but that they "milk exceedingly well," will not be so readily acknowledged. To endeavour to unite these two good qualities in the same breed of cattle, is, perhaps, militating against Nature; attempting to combine uncombinable principles: the scheme should therefore be abandoned, and thrown into the same class of desiderata, as the philosopher's stone, and perpetual motion.

The late Mr. Fletcher, of Gwernhayled, having tried every denomination of improved breeds of cattle, found none of them to answer the purposes of the dairy farmer so well as a cross between the Staffordshire and the Scotch Galloway. They are good milkers; and so hardy, that five of them require no more food than three of many other breeds; which makes six quarts of their milk equal in value to ten quarts of others, whose expense of keep in proportion to theirs, is as five to three.

Of maladies incident to cattle, that which, in Montgomeryshire, is called the *bloody murrain*, is the most fatal. In Anglesey, by reason of its being so destructive, it is by way of eminence called *y clwy**; and in many parts of the district, from the brevity of its duration, *y clwy byrr*.

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* i. e. *The Disease*; owing to its being more fatal than any other.

The symptoms of this disorder, in all its stages, are very similar to those of the pestilential murrain, which at different periods raged among cattle in several parts of Europe. All the difference seems to be, that this, under the name of bloody murrain, is not infectious; and that, in general, it attacks only young cattle, from eight to twelve months old. The prime of the stock, in high condition, and full of blood, are the most subject to it; and that about November, on change of food. Some farmers suppose they can sometimes discover this disorder in its incipient stage, by a lameness in the foot; and accordingly fancy that they can arrest its further progress by a tight ligament on the small of the leg, and a very copious bleeding. It is however difficult to ascertain, whether this lameness would have ended in a bloody murrain, had all means of cure been neglected. The first certain symptom is an affection of the brain, and a paralyzation of the adjacent parts. The disorder then proceeds towards the chest, and the inspissated humours may be felt spongy under the skin: a mortification ensues, and the death of the animal is certain. Some have attempted to stop the progress of the disorder, about the fore part of the chest, by a scarification of the part affected, and an application of alexipharmics, hellebore, garlick, rue, tobacco, &c. These are made into a kind of poultice, and sown up under the skin, where the incision had been made; the wound being previously washed with spirits of wine, or of turpentine. The animal is sometimes also drenched with a mixture of salt, sulphur, gun-powder, and soot; washed down with water.

These were the ineffectual means recommended by the faculty at the time of the general murrain, in the year 1745; and they are generally, still ineffectual in this disorder. Some few cattle however have escaped death, with the loss of a limb, or at least perpetual lameness.

It is much easier to prevent than to cure diseases, in all kinds of animal beings. It is probable that young cattle should be bled, and drenched, early in autumn; especially such as be of a full habit; and then the constitution will be prepared for a change of fodder. By turning out to grass at May, the case is very different, and the aid of the doctor is not so necessary. Instead of bleeding, some farmers rowel all their calves at Michaelmas; supposing that the humour issuing out of the setons will prevent the "murrain of the blood:" Some farriers perform the operation, and will insure the young stock of their employers from this last mentioned disease, at a small per-centage.

The nostrums of our cow-doctors, and farriers, are plagiarisms from Markham, Bracken, Bartlet, and other writers on the veterinarian art; which, by being commonly too violent in their operation, (like those of their fellow quacks, the leeches, who suck not only the blood, but the money and lives of thousands of their fellow creatures), it generally happens, that for one they cure, they kill three.

Scientific men, who have studied the disorders of cattle, and the methods of cure, residing at proper distances from each other, throughout the country, would certainly be one of the most useful classes in civil society. Farmers universally lament the want of such a very necessary order of men; and were such a national institute founded, they would willingly contribute towards making them an adequate recompense for their services.

SECT. II.—SHEEP.

The largest of the native breeds is that of Anglesey; weighing, as they are variously fed, from 10 to 16 lbs. per quarter; and some few reach 18 lbs. Whether these sheep were originally the same with the Caernarvonshire kind, and got their present superiority in size from milder climate and better soil; or an exotic species brought over from Ireland, cannot be well known. They yield wool from one pound and three-quarters to two pounds and an half, which sold in the summer of 1797 for six shillings and six-pence per provincial pound of five pounds avoirdupois. They are sheared about the middle of May, or early in June. Some are shorn twice in the season; the practice being thought a kind of preventive for the scab. Wedders are killed at the age of from one to four years; and produce from six to nine pounds of tallow. Mr. Lloyd, of Maes y Porth, had two rams killed at three years old, having been only two months in pasture. Their treatment had been exactly the same; their size was nearly equal, weighing about 18 lbs. per quarter; but their difference in tallow was very great, one having five, the other 17 pounds.

The annual exportation of sheep from Anglesey, is from five to seven thousand. The number purchased by four English drovers, in the year 1796, was 5700. They have white legs and faces; and are generally without horns.

The

The *second* kind of sheep in North Wales, is that peculiar to the highlands, if the mountainous tracks of the five other counties may be so called. They have generally white faces and legs; some have horns, and others none. The smaller sort of them weigh from seven to nine pounds per quarter; and give wool from three quarters of a pound, to one pound and an half. The larger kind weigh from nine to twelve pounds per quarter, and yield wool from one pound and an half, to two pounds and an half. However small the mutton, and coarse the wool of this breed, yet it is found by experience to be capable of improvement in itself, without any crossing whatever. By selecting the best males and females for breeders, and by giving them better keep, Mr. Corbet, and some others, have improved the size of the native Meirionyddshire from eight and nine pounds to twelve and thirteen pounds per quarter. There are two or three farmers in the parishes of Tal y Llyn and Llanvihangel, at the skirts of Cadair Idris, who, by disposing of the callings of their lambs, at five or six months old, and by further selling off the least promising of their yearlings the May following, have always a select stock; insomuch, that they sell rams at one pound eleven shillings and six-pence each, and wedders from the hills at 20*s*. each, while those of their neighbours, of the same original kind, and reared in similar situations, but under a more neglected management, are sold at from ten to fourteen shillings a head. Now (1809), sheep sell at much lower prices.

The *third* kind is peculiar to the Kerry Hills in Montgomeryshire; being, perhaps, the only species in North Wales, which produceth perfect wool; that of every other Welsh breed being, more or less, mixed with coarse long hairs, called by the manufacturers kemps[*], making the article in which they appear, of much less value. The characteristics of this breed, are large woolly cheeks, white bunchy foreheads, white legs covered with wool; no horns, and a broad beaver-like tail. They are very hardy, and comparatively tame; being not so much disposed to ramble as most other wild sheep. In shape, however, they are far short of compact symmetry; and were this defect improved, by the care and attention of the farmers, the breed would be worthy of being universally adopted throughout the Principality. They weigh, when fat, from 10 to 14 lbs. per quarter. The average of wool, including the whole flock, is ten stone, of 15 lbs. each, from every 100 sheep. The average price is from one guinea to 24*s*. per stone. In 1798, Mr. Davies, of Gwernygo, sold the wool of his flock, at 24*s*. per stone, for 30 *l*. In 1797, and 1798, rams sold for 1*l*. 11*s*. 6*d*. and wedders from the hills, at from 18*s*. to 20*s*. each. The Kerry Hills, to enclose which, an Act of Parliament was lately procured, are said to have generally summered about 12,000 of these sheep, besides horses and cattle.

The *fourth* kind is the black-faced, and fine woolled sheep, bred on the Long-Mountain, near Welsh Pool; and on other hills, on the borders of England, in a line from thence to Wrexham. Their wool, in 1797, sold for from one guinea to 28*s*. per stone of 15 lbs[†].

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[*] These long hairs are called in the Highlands of Scotland, and in the Shetland isles, *scudda* and *fòrs*: and what seems extraordinary, the act of nipping them with shears, when they appear above the wool, is expressed in North Wales by the verb *forsio*; although the hairs themselves have had another appellative—*sytbvlew*.

[†] In 1800, and 1801, this wool sold for from 26*s*. to 35*s*. per stone; and wool of every other quality advanced nearly in proportion.

The flavour of the mutton of the sheep feeding upon the Llanymyneich and Porthywaen lime-rocks, is reckoned very delicious, by the nice-palated pupils of the Epicurean school: and their wool is as fine as any in England; that of the Ryeland breed, perhaps, excepted.

A person, in travelling through the country, may observe several other kinds of sheep; being crosses from some or other of the above four distinct breeds: but, as they are in general, the offspring of chance and instinct, without being directed by any choice, or laid system of their owners, they do not claim notice.

Of late introduced breeds, both the quantity and quality of *wool*, that valuable article of the staple manufacture of our country, if experiments succeed, will soon be much improved. To name a few gentlemen who are anxious to promote this public good, might justly be deemed partial; because the spirit of rivalship in the introduction of the best breeds, is become general; from the spirited farmer, renting only 200*l.* a year, to the opulent land-owner, possessing an estate of from 3000*l.* to 30,000*l.* per annum.

His Majesty, with a patriotism worthy of the Sovereign of a Manufacturing Nation, has distributed several Merino rams among gentlemen residing in this district. The average weight of the fleece of the pure Spanish is six pounds and an half; and a cross between a Spanish ram and some Tal y llyn ewes, in the possession of Sir John Williams, of Bodelwyddan, gives fleeces of four pounds and an half each, with an addition to the carcass of about three pounds per quarter.

It is to be regretted, that some difficulty is found in manufacturing this half-Spanish wool, in the common method, with the hand; but how far the application of machinery may succeed in removing the cause of this general complaint, must be left for time to discover. Were this breed to become more general, and its wool manufacturable, it would, within this district, be a principal source of opulence; in proportion to which, increase of bulk in the carcass is a mere secondary attainment.

Result of Experiments made by Mr. Yorke, at Erthig, in crossing the Welsh and Shropshire Breeds of Sheep with the Spanish.

Sort of Wedders; being Lambs in 1795, and reared on Enclosed Ground.	Average Weight in July 1797, being Two Years Old.	Value, July 1797.	One Year's Wool in July 1797.		Weight of Mutton, and Value of the Wedder, when killed Fat, in Dec. 1797.	
			Weight.	Value.		
	lbs.	*s.*	*lbs.*	*s.* *d.*	*lbs.*	*£.* *s.* *d.*
I. Welsh Mountaineers	36	14	3	2 6	44	0 17 0
II. Half Welsh and half Spanish -	40	16	8	3 6	50	1 2 0
III. Half Small Shropshire and half Spanish - -	44	18	3½	4 8	58	1 5 6
IV. Three-fourths Spanish, and one-fourth Shropshire - - -	ditto	ditto	ditto	ditto	ditto	ditto

No. I. were of the common mountain breed; but kept in poor enclosed ground from the time of yeaning: those reared on the hills being of less weight and value.

No. II. a cross between common Welsh ewes and a Spanish ram;—always kept in the fields, being thought too delicate for the hilly climate.

No. III.

No. III. a cross between a Spanish ram and small Shropshire ewes, bred on the hill, very little heavier than the Welsh ewes, but finer woolled.

No. IV. The difference between this class and the third, seems to be only in the quality of the wool, which is nearly as fine as that of the Spanish ram; to this may be added a greater tendency to fatten.

Experiments on the Spanish Cross, by Mr. Colley, of Cevn Gwyddvid.

	lbs.		s.	d.
Wool clipped off a Spanish ram, June 30, 1797	6¾	value	13	6
Wool clipped off the largest of three yearlings, being a cross between the Spaniard and a Welsh ewe	4¼	……	6	9
Wool of the second yearling; the same cross	3½	……	5	3
Wool of the third yearling, ditto	3	……	4	6
Wool of the three dams put together	4½	……	4	6

Superior weight of carcass, is the least benefit to be expected by crossing with the Spanish sheep: a greater tendency to fatten, and finer wool, are more material objects. Of the value of the wool of the fourth class, or three-quarter Spanish, we are as yet ignorant in this country. At present, very little more can be had for it than for common wool; and the quantity, as yet, is too small to attract the notice of distant manufacturers. It has been proved, by experiments, that the Spanish breed cannot thrive on the Welsh mountains: a cross of three-fourths Welsh, and one-fourth Spanish, may probably become naturalized to those bleak situations. The wool of the lambs is too short to screen them from the weather, on the hills; but they may answer well on low commons in summer, and on poor enclosed grounds in winter. They are too light in the carcass to be kept as breeders on rich land.

Other breeds, kept on enclosed grounds, by a few experimental farmers, are the Dorsets, the Old Leicesters, the New Leicesters, and particularly the South Downs: and crosses, between the New Leicesters and the South Downs; between the New Leicesters and select Berwyns; between the South Downs and the black-faced Shropshires; between Ryelands and Berwyns, &c.

In introducing new breeds of sheep into North Wales, there are three material precautions, which should be duly weighed. The *first* is, that the change of climate be not too great; the *second*, that the sheep should have agility enough to walk to distant markets, for owing to the scattered population of the country, the internal consumption of mutton is as yet inconsiderable; the *third*, that the quality of the wool be such as would be saleable to our own manufacturers. Of the fourteen different breeds, contained in Mr. Culley's Synopsis; the Herefordshire, the South Down, and the Cheviot, seem best adapted; the two former to lowland, and the latter to highland, situations. But it is a question of some importance, whether any new breeds (the Herefordshire and South Down perhaps excepted) need be introduced at all? The large English breeds collect fat on the *outside* only; the Welsh sheep shew no such partiality—they grow fat *inside* as well. An Anglesey ram, as before related, weighing 18 lbs. per quarter, gave 17 lbs. of inside fat. A four-year old wether, of the pure Welsh breed, reared on the Berwyn Hills, and weighing only 12 lbs. per quarter, gave 11 lbs. of inside fat; without having any other food than common grass. The natural wildness of the Welsh sheep, is the main preventive to their quick feeding. Whenever they are turned to fatten, they should be closely paddocked, in places least frequented by dogs, and other intruders.

To speculate about bringing in some hardy breeds from Scotland, or the North of England, is folly: our own sheep are full as hardy, and their wool generally finer, and adapted to our established manufactures. Were the Kerry sheep introduced upon the Berwyn, and other extensive hills, to the gradual but final exclusion of the present breed, the wool would certainly be greatly improved; at least 5*s*. per stone. Of the Kerry sheep being sufficiently hardy for any situation within this district, there cannot be the least doubt. Nature seems to have clothed them from top to toe, as if designedly to brave the alpine storm.

Sheep are generally washed, under the hand, in deep running water; and sheared, when dry, with their legs tied. In warm situations, near the sea-shore, they are sheared twice in the year: and on high mountains, overrun with heath, where more than one shearing is not thought expedient, their necks and cheeks only are clipped in autumn, to prevent the clinging of icicles in snow and frosty weather.

Diseases of Sheep.—1. *Scab.*—About the year 1774, a gentleman, with the patriotic intention of improving the Anglesey breed, brought thither a Dishley ram, and with him the *scab;* a disease, till then, totally unknown in North Wales; and it is to be lamented that the infection soon found its way from Anglesey across the Menai; and proceeding through the hardy race of Snowdon, into the counties of Meirionydd and Montgomery, it continues its progress eastward towards its native country, having completed the fashionable tour of North Wales.

As the Welsh breeds are not naturally infected with this disorder, were sheep-owners with one mind to make a joint exertion, there would remain no doubt of its being totally eradicated: but one farmer curing his flock this year, and his neighbour the next, the infection is still preserved. Besides a reduction in value of the animals, the loss in wool is very considerable.

To cure the scab, several kinds of ointments and lotions have been tried. In this, as well as in many other cases, mercurials are found to be the grand specifics. Some shepherds, after parting the wool, anoint the whole length of the spine with an unguent, made of the infusion of tobacco in urine, soft soap, and sulphur; which has generally the desired effect: and some admit arsenic as an ingredient. A lotion is also used, made of spirit of turpentine, vitriol, and urine.

2. In particular situations, after wet winters, the *rot* attacks sheep of every age, except yearlings.' For this disease, dry oatmeal and salt are recommended, as a preventive; which might be rendered less necessary, by an active shepherd, and by furrows being ploughed, at proper distances, across moist sheep-walks, to carry off the surface-water.

3. Uniformity of keep, is a maxim that should be carefully attended to in rearing of sheep. Lambs and yearlings once indulged with good pasture, and afterwards reduced to a scanty allowance, frequently contract a fatal disorder, called, by the farmers, *red-water;* which is a consumption of the inside fat, converting it into a reddish liquid. Spirit of turpentine

is recommended to carry off the complaint, and perhaps life also, by a diabetes.

4. Where sheep are fed on turnips, the commencement of *frosty* weather oftentimes proves mortal to numbers of them. They generally die suddenly at the break of day. Sir John Williams, of Bodelwyddan, calculated his loss, on some frosty winters, as high as ten per cent.; while on milder winters, not above five per cent. perished. Of late years, he has ordered his sheep to be driven off the turnips, under sheds at night, upon a litter of shell-sand; by which his flock has been much better preserved from the malady. Mr. Tudor found frequent bleeding in the nose to have good effect.

Our sheep are affected with very few distempers besides these already enumerated. Upon the dry heathy mountains, thousands of the hardy race never experience any other death than that occasioned either by the butcher's blade, or by heavy drifts of snow. Of the latter, shepherds, in exposed situations, cannot think without horror. Sheep have frequently been found dead under snow, by 20 or 30 in a heap: but if they be not smothered on its first collecting, they have a chance of surviving; and there have been instances of some taken out *alive*, after having lain under several yards of snow for three or four weeks, and devoured most of their own wool. It is the opinion of some persons, that the average annual loss in sheep is about seven per cent. In some years it amounts to 20, 30, 40, and even 50 per cent.; and Mr. David Erasmus, a well-known sheep-breeder in Montgomeryshire, in one year lost 75 per cent. amounting to 1500; most of which had perished under snow. If the wind continue to drive the snow altogether from the same quarter, sheep are not in so much danger; for instinct directs them where to seek and find a place of safety.

The late Lord Penrhyn caused sheds to be erected, in the most convenient places, on the Llanllechid Hills, to afford shelter for sheep in winter.

R. W. Price, Esq. of Rhiwlas, has built stone walls, crossing each other at right angles, in several parts of his extensive and elevated sheep-walks in Meirionyddshire; so that from whatever point the storm drives, the hardy race may take refuge on the opposite sides.

SECT. III.—HORSES.

In Anglesey, for want of fences about the enclosures, the horses, as well as the sheep, are commonly fettered. Were colts of the best-shaped breed in existence, thus fettered as soon as ever they are weaned from their dams, and the practice used from generation to generation, their natural gait and shape must necessarily be changed, at length, into awkwardness and deformity. Few English stallions have as yet been introduced into the island; and those that have, do not appear to have done much towards improving the native breed: but were the system of crossing pursued with spirit and Bakewellian judgment, and the poor natives released from their present confinement, Anglesey, without a doubt, would soon become as famous for horses as it is now for oxen.

In the county of Meirionydd, and the hilly parts of Montgomeryshire, great numbers of ponies, commonly called *merlins*, are reared. They are exceedingly hardy, having, during winter as well as summer, only the range of the hills; from whence they are never brought down until they be three years old, and fit for sale. What has tended to, and will in time destroy the shape and good qualities of this hardy race, is, that in the propagation of their species, they are left entirely to chance and instinct; by which promiscuous breeding, deformity, and further diminution of size, gradually take place.

They are driven from the hills to fairs, like flocks of wild sheep; and the place of sale exhibits, in some degree, an amphitheatre, where manhood and poneyhood strive for the victory. When a chapman has fixed upon his choice at a distance, the wrestler, being generally the seller's servant, rushes into the midst of the herd, and seizes the selected animal; which, never before touched by human hand, struggles with all its might to extricate itself; and in some particular situations, both have tumbled topsy-turvy from the summit of a steep hill down into a river beneath; the biped still continuing his grasp, and the quadruped disdaining tamely to submit.

The ponies have formerly sold, at various prices, from 30*s*. to four guineas: but now, like most other horses, they have dropt 40 or even 50 per cent.; if indeed they can be sold at any rate*.

Another breed, somewhat larger than these, and probably raised by a series of crossing between the English and the natives; are hardy, handsome, and exceedingly active. Some of them are too small for the team; but for the road, under moderate weight, they have no rivals. They will ascend and descend our "mountainous staircases" with the greatest agility; and without giving their riders, who have more foolhardiness than humanity, the trouble of alighting. The larger kind of them is excellently well adapted for the team, on small or steep mountainous farms; where the great strength, and sluggishness, of the heavy kind of horses, would be egregiously misapplied.

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* Since the year 1797, the case has been very different. From 1800 to 1809, horses, of all descriptions, have generally fetched extraordinary prices.

The Vales of Montgomeryshire, have long been noted for an excellent breed. Some attribute this superiority, to a stud of horses kept by Queen Elizabeth, at Park, near Caer Sws, in the Severn Vale; and to others brought into this part of the country from Spain, by Robert Earl of Shrewsbury*.

Gentlemen, in most parts of the district, and farmers in the vales of the three counties bordering on England, have for some time furnished themselves with excellent draught horses, both for the coach and the waggon; which, when the markets are open, are sold in great numbers. They are generally either black or bay; strong, active, well made, and measure from 15 to 16 hands high.

A custom, very injurious to the growth, strength, and soundness of horses, prevails over the greatest part of the six counties; that is, working them too young; when their bones have not attained firmness from their cartilaginous state; nor their muscular system that power of elasticity, contraction, and extension, which is requisite to endure exertion and labour. Instances have, however occurred, of horses being worked from two to twenty years old, without any apparent detriment, saving a diminution of their natural size.

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* Pennant's Tour of Wales, in Montgomeryshire.

The late and present high price of neat cattle, and of all kinds of provisions, and the predilection which farmers nevertheless manifest in favour of horse-teams, may, in time, reduce the nation to the dilemma of either diminishing the number of horses, or of enacting a law to repeal the Mosaic, and enjoin the flesh eatable.

Some writers argue, that were not horse-teams preferable to those of oxen, they would not be in such general use. This is laying the argument on too weak a foundation, and deeming public opinion infallible. That horses are *preferred* to oxen, is one thing, and that they are *preferable*, is another: the former position is true, the latter not so apparent. The former may be owing to, and have its rise from, a whole multitude following some few misleading guides; without ever enquiring into, much less being fully convinced of, the rectitude of their favourite theory. Such has been the eccentricity of national taste, that things as opposite to each other, as light and darkness, have each in its turn, become the idol of public opinion. The former may be owing also to an epidemic vanity and pride; for it is nothing extraordinary, to see two neighbouring tenants striving to outvie each other, in the number, size, sleekness, expensive and cumbersome gearing of their team-horses, to their mutual great detriment. Servants, and other followers of teams, have a hand also in furthering this prevalent mania: it is even an insult to a young man to ask him to engage in so mean an occupation as that of following a team of oxen. The negative to the latter position, that horse-teams are *preferable* to those of oxen, is found by a fair calculation of the expense and profit arising from each; and then striking the balance: an instance whereof is here subjoined, drawn up by an Anglesey farmer, and sent to the Writer of this Report.

Horses, (Four Ploughs.)

Dr.

		£	s.
1792.	To paid for 12 horses, at 15*l.* each	£180	0
	Interest of the money for three years	27	0
	Keep of the horses for three years, at 9*l.* per year, each; (2*l.* summer, 7*l.* winter)	324	0
	Shoeing for three years, at 7*s.* 6*d.* per year, each horse	13	10
	Gears, oil, &c. for three years	20	0
	Servants, (four men and four boys), for three years, at the rate of 24*l.* 10*s.* for each man and boy, per year	294	0
1795.	Three months grass this summer, to make them fit for market	12	0
		£870	10
	To Balance	238	6
		£1108	16

Cr.

		£	s.
1795.	By sold 12 horses, at 12*l.* each	£144	0
	Their work for three years, reckoning 268 working days in each year, at 6*s.* each plough per day	964	16
		£1108	16

Oxen. (Five Ploughs.)

Dr.

1792.	To paid for 20 oxen at 7*l.* each	£140	0	
	Interest of the money for three years	21	0	
	Their keep for three years, at the rate of 4*l.* 14*s.* 6*d.* each, per year (three guineas winter, one guinea and an half summer)..	283	10	
	Yokes, shoeing, &c. for three years, at 4*l.* per year	12	0	
	Servants, (five men and five boys), for three years, at the rate of 24*l.* 10*s.* for each man and boy, per year	367	10	
1795.	Five months grass this summer, to make them fit for market (half fat)	26	0	
		£850	0	
	To Balance	475	0	
		£1325	0	
		£475	0	
		238	[illegible]	6
	Balance in favour of oxen	£236	[illegible]	4

Cr.

1792.	By sold 20 oxen, at 16*l.* each	£320	0
	Their work for threee years, reckoning 268 working days in each year, at 5*s.* each plough per day	1005	0
		£1325	0

" Above, you have an account of the use, &c. of oxen in husbandry, compared with horses; and I have charged every thing according to the expense I have been at.

" My servants will have it, that an ox-team in my large fields will do as much as a horse-team; but I think otherwise: however, I am certain that 20 oxen will do full as much, if not more, than 12 horses; reckoning four of the former, and three of the latter, to each plough. My plan is, to sell out eight oxen every year, at six years old; and to take in the like number of three-year olds, which are trained by the remaining sixteen very soon, and much easier than if the teams had consisted all of fresh ones. When I take the young ones in to be trained, I work six in a team for a while; and by putting the fresh pair in the middle, they are soon tamed. You will observe, that all my oxen work three years. The elder eight are taken out every May, and kept in good grass until September, sometimes October; when they are called for, half fat, or better. One year I fed them with turnips, and meal, after the grass, and sent them to Chester fair the April following; and they paid very well. I have four now feeding so; but as they are too large for the markets of this country, I prefer selling them half fat, and to dispose of the turnips to other cattle, and sheep. The lowering of the price of cattle in the latter end of the year, was the cause of their remaining with me."

Jan. 20th, 1799.

The above sketch of the comparative expense and profit of horses and oxen, may be presumed to be a candid statement, without the writer's being prejudiced in favour of either system. But supposing the four horse-teams to plough an acre each per day, and the five ox-teams three roods and eight perches each; according to the farmer's charge, an acre ploughed by the former will cost 6*s.*, and by the latter 6*s.* 3*d.*; therefore, if 3*d.* per day be deducted out of each ox-team's earning in the foregoing sketch, the balance in favour of oxen will be reduced from 236*l.* 14*s.* to 186*l.* 9*s.* which is, nevertheless, sufficient to preponderate the scale in favour of matters of fact, against prejudice and public opinion: and the higher per centage of insurance of horses than oxen, by reason of the former being more subject to diseases, &c., will give an additional preponderancy in favour of the latter*.

If

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* The Anglesey Farmer's account of horse and ox-teams respectively, is not a fair statement of the case. No mention is made of the age of the horses; if bought in at three years old, and sold at six, as the oxen, the probability is, that the advantages would be more equally balanced. Had he acted so, he would not have bought his horses at 15*l.* and sold at 12*l.*, but *vice versa*; or rather bought at 12*l.* and sold at 18*l.* or even 20*l.* The keep of oxen is placed too low. The horse manure is also of superior value. Small farmers may, and do, make good profit by the rearing of horses. A brood mare brings them a colt, which is workable occasionally, in the middle of a three horse team, at two years old. Its work for two years more, will pay for its keep during that period; and then he may generally be sold at a price of double his value at two years old; and this surplus will be found very convenient in assisting to complete a payment of rent†.—*Note, by a Montgomeryshire Farmer.*

† A note upon note never appears well; however, it is here necessary. The advocate for horses thinks, that had the Anglesey Farmer bought in his horses at three years old, and sold them at six, as the oxen, "the advantages would be more equally balanced." True: but can such a jockeying system be *universally* adopted, as in the case of oxen? A farmer may buy his horses at three years old, and after working them for three years, may dispose of them to *his own* advantage; a score, or a thousand farmers, may do the same: but by thus shouldering the evil from themselves, it must, sooner or later, fall upon the public. In general arguments,

we

If the superior value of oxen after working five or six years, be not a sufficient incitement to take them into general use, neither is the surplus earning of horses over that of oxen, in an eqnal space of time, sufficient to recommend them to the exclusive use of the farmer. In the account of labour, there is certainly a balance in favour of the horse; but this balance must be dashed off, and carried to the opposite page, when the days of labour are over. The *ox* will then either furnish his owner's table with beef, or line his pocket with gold; but the *horse*, rendered infirm either by age or accident, is but of little value; unless a caballine institute be formed, to convert his whole carcass, bones and all, into spermaceti. This would decide the argument completely: spermaceti candles would be generally used; and consequently tallow and oxen would be much reduced in value!

It must not be understood that the advocates for oxen want to bring them into too general use: far from it; that would be as imprudent as it is impracticable. Both horses and oxen are gifts of bountiful Providence

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we do not contend for *individual* interest, but for *public* good, when they are at variance. In getting fresh recruits for ox-teams, according to the Anglesey farmer's system, there does not seem to be the least difficulty, or inconvenience: upon a farm duly proportioned of pasture and arable, the farmer may rear them himself. In supplying his teams with horses every year, he could not find it equally feasible: and if he could, we may still put the question, whether the *public* would be more benefited by his keeping constantly, four brood mares, or eight milch kine? But, alas! *self* is the reigning monarch; the *public*, at present, seems to be only an imaginary being. Opinions of old writers are now calumniated with the epithets, "antiquated, barbarous," &c.; nevertheless, it may not be amiss here to quote Judge Fitz Herbert, in his "*Boke of Husbandrie*," (Edit. 1767, p. 68), written in the reign of Hen. 8th.—"*Therefore me semeth, all thynges considered, the ploughe of oxen is much more profytable than the ploughe of horses.*"—Trans-Menaiensis.

to man; and both have their peculiar and distinct province to serve in, as much as they be distinct animals. In fine, the farmers who keep two teams, should always have one composed of oxen: and there does not appear the least necessity why farmers in the neighbourhood of canals, and such conveniences for conveying manure, and exporting the products of their farms, should keep any horse-teams at all.

The common practice throughout the whole of this district, is to *yoke* oxen in pairs. Some few draw them singly, collared, &c. like horses. A team of Montgomeryshire oxen, five in number, whereof one was a bull seg, not worth above ten pounds, with their collars and gearing, sold in April 1809, at Kerry, for 101*l.* 17*s.*

Horses are commonly drawn singly; and when a great weight is to be put in motion, they are supposed to have greater power when hooked doubly; as their drawing force is then more concentrated, by being within a more proper distance of the point of resistance: this is one advantage of applying a pair of horses a-breast to a Scotch plough.

Soiling of horses, in farm-yards and stables, with green clover, vetches, &c. is beginning to come into practice. By this means, farmers find great saving in fodder, besides the valuable acquisition of manure; and lean horses also will acquire a marketable condition in a much less space of time.

Tender furze, bruised with mallets, or ground in mills erected for the purpose, was formerly a great article of fodder, in the counties of Anglesey and Caernarvon. Farmers were then accustomed to sow furze for their horses; and sometimes to lett the crop at a certain price per acre, which was frequently found to pay better than a crop of wheat: but Ceres, at length, seems to have grown ashamed of such husbandry; and the lands are, in general, converted to bear more useful crops.

Mr. Corbet, for the convenience of rearing racehorses, which in a Newmarket calendar, are the most valuable animals upon earth, but in the scale of public economy, some few at a National Museum, to gratify the curiosity of the naturalist, would be quite sufficient, has constructed five paddocks, fenced with stone walls, with sheds in each, and a stream of water, by which all may be completely irrigated. They are spring fed with sheep, and afterwards afford early grass of a better quality, for the young horses. When they have nearly grazed the first piece, they are turned into the second; are succeeded by neat cattle, and these again by sheep. By this means, no tufts of any kind of grass are left; the one species of animals relishing the leavings of another; and so on, over the range of paddocks, in constant rotation.

It should have been mentioned among Mr. Corbet's improvements, that the farm on which he erected these conveniences, containing about 80 acres, was lett, when he came to the estate, in the year 1782, at 10*l.* a year; and the tenant could not be prevailed upon to advance his rent to 12*l.* Mr. Corbet, taking the farm under his own management, has improved the whole, by draining and watering, so as to be worth 12*s.* per acre, to any farmer, exclusive of those works of supererogation, the walled paddocks.

SECT. IV.—HOGS.

The original Welsh breed had small ears: which, probably, by a cross with the Berkshires, produced the slouched-eared hogs, which were lately general through the country. They are slow-feeders, and the rearing of them is now upon the decline. By various crossings with the Chinese, two species were procured: the first small, mischievous, &c.; colour, fore part all black, or all white, and the hinder part counterchanged; sometimes all black. These have been discarded: the second, having less of the Chinese mixture, are larger, short-eared, round and deep-chested, generally spotted, but sometimes all white; quiet, and quick feeders; seldom in worse condition than half fat. For these reasons they have supplanted the other species in several parts of the district. Their bacon is reckoned sweeter, being less subject to rancidity than that of the slouched-eared breed. They are moreover, more prolific; some sows having brought 30 pigs before they were full two years old. Unaccountably, these short-eared species have, in this district, had the nick appellation of *Berkshires*.

In Anglesey, store pigs are always bought by jobbers, who travel the country from house to house, and vary in price, according to demand, from 2*d.* to 6*d.* per pound, live weight. Sucking pigs, when the market runs high, sell for from a guinea to a guinea and an half each; but when low, from half-a-crown to four shillings. Five thousand hogs, according to the best information, are sent annually from Anglesey into the English markets; and three thousand from the promontory of Lleyn and Evionydd, in Caernarvonshire;

shire; which bring into those parts of the country, upon an average, about 24,000*l.* per annum.

Where a number of milch kine are kept, the offal of the dairy, and range of grass, or clover, support the hogs during summer; and when they have cleared the stubbles after harvest, they are sold off in great numbers. Upon an inferior kind of feeding, with grains, potatoes, &c. at the age of from nine to twelve months, they weigh from 2 cwt. to 3 cwt.; but when fed with pease and grain, at from 12 to 18 months old, they will advance to the bulk of from 3 cwt. to 5 cwt. In the Montgomeryshire vales, about one-eighth, and in the more hilly parts, about one-fourteenth, of the land in tillage, was formerly occupied in growing pease, which were almost entirely consumed in feeding hogs: of late, the cultivation of pease has much decreased, owing to the uncertainty of the crop; and the land in consequence filled with charlock, sow-thistle, &c. On the best strong soils, drilled beans would be a more profitable crop; and when ground to meal, may answer better in feeding hogs than pease given whole, which is the more common practice. There is no experiment known here how bean-meal will succeed in feeding hogs; but it is highly approved of in rearing calves.

The six years' offspring of one sow, of the larger, or slouched-ear breed, were sold, by Mr. Wynne, of Ryton, for 300 guineas; besides supplying, in part, his own family's consumption with bacon. He sold ten hogs in the autumn of 1801, having fed them for the last month with only bran and whey, for 80 guineas.

Experiments in soiling pigs with clover have been tried, and failed. Although they had plenty of litter, streams of water running through the stye-yards, and other accommodations, yet they did not grow well, much less did they feed; and some of the younger sort died. Vetches seem to answer the purpose better than clover. Some farmers having constantly a stock of about 40 hogs, confine them always in yards, excepting a few weeks after harvest. The quantity of manure collected by this method is very great; and the yards being near the stables, both kinds of dung are mixed, which reciprocally improve each other's quality.

Where store pigs are fed in yards, a proportionate quantity of litter is requisite, for the sake of increasing manure, and preserving some degree of cleanliness; but a bare flooring of tiles, or brick, without any litter at all, but kept clean, is found to be the best for fatting hogs.

That excellent breed, called the New Leicester, has of late been introduced into several parts of the district. This country had much to regret in the loss of the late Colonel Myddelton, of Chirk Castle; who, contrary to the general disposition of young men of rank and fortune, laudably exerted himself in the introduction of the improved breeds of all kinds of stock into his neighbourhood. One New Leicester boar sold at Chirk Castle sale for 31 guineas. The common run of male sucklings is five guineas; and of female, two guineas and a half. Some of this breed have been killed, when fat, weighing upwards of 600 lbs.

The males of several improved breeds of stock are kept by many patriotic gentlemen, for the gratuitous use of their tenantry.

In some parts of the district, the gristle, or cartilaginous periphery, of the snout, is cut with a sharp knife, to prevent the hogs injuring grass lands, &c.;

but this is a violent operation, and can hardly be expected to answer the purpose: the common preventives are twisted rings.

The most common disorder in hogs is, in some parts, called *bride:* the blood is affected, and the limbs paralyzed; supposed to be owing to change of beds, from the steaming dunghill into water, &c. Bleeding is found of the greatest efficacy: radle, a brown ochre, and butter-milk, is sometimes administered; and at other times a decoction of the herb called snap-dragon.

SECT. V. VI. VII. AND VIII.—RABBITS, POULTRY, PIGEONS, AND BEES.

In the interior of the district, there are but few rabbits; on the sea-coasts, where the sandiness of the soil favours their burrowing, they are very numerous; especially on Morva Dinlle, near Caernarvon, and about the ruins of Llanddwyn Monastery, the ancient Paphos of Wales, in Anglesey. The tenant at Bodowen, near Malldraeth Marsh, doubles the rent of the farm, being 109*l.*, on some years, by the sale of rabbit-skins. Talacre warren, in Flintshire, is recorded by Mr. Pennant, in his Tour of Wales, as worth 150*l.* a year, in skins only.

Our gallinaceous poultry consist of the common cock and hen, which give various prices, in proportion to the distance from market; and some few turkeys and guinea fowl. Our anserous poultry are ducks and geese. The latter are bought lean from the stubbles, in August and September, at from 2*s.* to 3*s.* each; and sent in droves to Shrewsbury, Chester, Liverpool, and other places. When fed, in November or December, they weigh from 12 lbs. to 16 lbs., and sell from 4*s*. to 5*s*. each. In Montgomeryshire, they are roasted drier than in any other part of the country, for the sake of the oil, which sells for from 1*s*. to 18*d*. per pound, to be used in the flannel manufacture of the county.

Few words must suffice for few pigeons: and the few that are, ought to be classed with the winged vermin. Instinct brings them from a great distance to feed on calcareous soils, and especially if they contain veins of mineral agaric. Their size has been attempted to be improved, by a cross with quoists, or wood pigeons; but the progeny becomes too wild for any domestic use.

BEES.

Our ancestors held these industrious people in great veneration, and believed them to be of paradisaical origin *. For this reason, their priests taught that the chanting of mass was not acceptable to the Deity, unless the lighted tapers were made of their wax. Out of their dulcid stores they brewed their national liquor, metheglin, or the medicinal beverage.

When the country was almost one continued wilderness, almost every hollow oak was an apiary: and as the woods were gradually destroyed, the bees were diminished in proportion. Their nests on the wastes were the property of the lords of the soil, and rented by some of their vassals. On freehold lands, they were claimed by the respective proprietors. The discoverer of a swarm was entitled by law to a reward of one penny, if they were domesticated bees; and one penny, and dinner, or in lieu of them the whole of the wax, if they were of the wild race. Whoever cut a tree upon another person's property, in order to get at the nest of bees, was to be amerced the full value of both tree and bees. The respective prices of different swarms were ascertained by law, in the following manner:

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* Wotton's Leges Wallicæ, p. 254.

	Pence.
The parent hive	24
The same, after emitting one colony	20
The same, after emitting a second	16
The same, after emitting a third	12
The first swarm	16
The second swarm	12
A colony from the first swarm	12
The same from the second swarm	8

Early swarms were reckoned of full value by the 1st of August: such as swarmed after that day, were not valued above four pence* until the following May.

In comparison with the prices of other articles, at the time the Welsh laws were framed, bees, by the above account, seem to have been very dear, and consequently scarce: but the price set upon them by law, was much above the real price in commerce, between buyer and seller. This was owing to the veneration they were held in by the Legislature; and intended to deter the subject from offending against the statutes made to preserve them. As a confirmation of this opinion, every thing that belonged to bees had its value exaggerated in law: even a bee-hive was appraised at 2*s*. when a new plough without irons was valued only at 2*d*.; a cow with the first calf 48*d*., a yearling calf 14*d*., and a sucking lamb 1*d*.

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* Several kinds of pence occur in the Welsh laws: *ceiniog gota*, a current coin; apparently equivalent to our present penny; and *ceiniog gyvraith*, or legal penny, an imaginary money, of the value of three halfpence current, *i. e.* sixpence in law was equal to ninepence in commerce.—*Wotton's Glossary.*

The sacred esteem in which bees were held, at length declining, apiaries were gradually reduced to their present fewness of number. However, several persons still execrate the profane act of disposing of their bees for money; but will, nevertheless, lett them out for one half share of the honey and wax, when they are killed annually in autumn; and the whole live stock to be parted equally between them, at the end of the fourth year.

Methods of procuring the honey, and preserving the bees alive, are not, perhaps, sufficiently attended to.

Among twelve premiums, proposed by the Wrexham Agricultural Society, for the year 1797, were the three following:

"Class III.

"I. To the cottager who, before the 1st of September, 1797, shall raise the greatest number of stocks or hives of bees, not fewer than seven—Three Guineas.

"II. To the cottager who shall raise the second greatest number—Two Guineas.

"III. To the cottager who shall raise the third greatest number—One Guinea."

Other Societies have since offered and bestowed similar premiums.

Large heathy mountains, such as those of Berwyn, swarm with a wild race of bees, when the heath *(erica vulgaris)* is in bloom. On those wilds a person may ride many miles without hearing the least noise, save the monotonous hum of these busy insects.

Druggists buy what honey is made above home consumption, for about 2*s*. per quart, ale measure; but it is retailed out more savingly, by ounces Troy. Thirty years ago, it was frequently sold for 1*s*. per quart.

CHAP. XIV.

RURAL ECONOMY.

SECT. I.—LABOUR—SERVANTS—LABOURERS—HOURS OF LABOUR.

THE price of labour is either high or low, in every country, in proportion to the industry and exertion of its inhabitants. A country can never acquire credit from cheapness of labour; because it is a certain sign of poverty and indolence. On the contrary, wherever industry, and its offspring wealth, have laid the foundation of prosperity, the price of labour will advance in proportion.

Some places lie under natural disadvantages, such as many of the interior and inaccessible parts of the district; where, in all probability, poverty will ever remain despot of the dreary waste. Wherever soils for tillage and plantations, streams of water for manufactories, veins of ore open to the day, and other local advantages, present themselves to the first bidders—it is to be expected, when peace returns, that adventurers will take the opportunity of enriching themselves, and advance thereby the price of labour, in every spot where it be practicable; and that every member of society will strain every nerve to advance the national opulence, far beyond the most glorious epoch that ever graced our British annals.

In the neighbourhood of manufactories, mine works, collieries, and canals in the making, the price of labour had advanced about 30 per cent. between the years 1793 and 1799; especially during harvest, and other seasons of emergency: and since the year 1799, another per centage advance has taken place.

Servants are commonly hired by the year of twelve calendar months*; and have had their wages advanced about 40 per cent. within the last 15 years. A waggoner, or husbandman as he is called, capable of undertaking the management of a farm, has from 12*l.* to 15 guineas a year, with his lodging and victuals; which are always found for all denominations of servants, excepting those of non-résident gentry, &c. who accordingly have board-wages. A second servant, for thrashing, ditching, and such occupations, from 9*l.* to 12*l.*; and so on, in proportion to the capacity and undertaking of the person. Wages vary from this common standard, in proportion to the state of agriculture in different parts.

In those parts of Denbighshire and Flintshire which adjoin Cheshire, servants begin their year on the 1st of January; in some parts of Meirionyddshire, on the 1st of November; but in the greater part of the district on the 1st of May, which is by much the most inconvenient time in the whole year for that purpose. In general, barley seedness is not then over; and kine begin to come into profit. These circumstances increase the difficulty occasioned by the inaptitude of new servants.

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* And not by the new-fangled year of eleven months, as is the practice in some parts, in order that servants shall not gain settlements there by service; which is an illegal combination of one set of men against the body politic, and deserves the notice, and even the censure, of the Legislature.

The hiring year should therefore, by common consent, begin in every part on the 1st of January, the commencement of the civil year; and end the 31st of December; when servants may remove, and keep their Christmas holidays, at a season when their labour is most easily dispensed with.

As the annual wages of servants vary, in different parts, in proportion to their respective state in agriculture and manufactures; so also do the daily wages of labourers. With victuals, from 10*d.* to 14*d.*; without, from 18*d.* to 2*s.* per day, are the common averages; which are proportionally reduced or advanced as cases require. Some give an average of 18*d.*, without victuals, all the year round. In harvest time, farmers always provide victuals, except they set their hay, or corn, to be cut by the acre; when they allow only beer. Harvest wages is of great latitude, from 2*s.* to 4*s.* per day, with victuals.

In the Vale of Clwyd, and its vicinity, the farmers, during hay and corn harvest, go every morning to the cross or market-place in the towns of Wrexham, Ruthin, and Denbigh, to hire workmen for that day only. They are there collected for the purpose, with their scythes and hooks ready; and exact wages according to the prospect of weather, and the number of men wanting employment. At Rhuddlan, in the lower end of the Vale, labourers meet together on Sunday morning; and are hired by the neighbouring farmers for the following week.

This daily hiring is an absurd custom, retained from remote ages, when much less grain was grown, and agriculture was in its infancy. It is injurious to both parties, the farmers as well as the labourers. No lodging required in the farm-house, may be considered as an advantage; but it is frequently an advantage dearly bought. The farmer is every morning parading the market-towns, when he ought to be busily employed in his fields at home.

In other places, men are hired at once for from a fortnight to a month, but most generally until the song of *harvest-home* be over.

Farmers set task-work, as near as they can guess, by the scale of day-wages; but from greater exertion and perseverance, labourers in general get about one-third more by that means, than would be allowed them by the day.

Hours of labour are various: some active men will work only twelve hours; and if, by attending task-work artificers, they work from five in the morning to seven in the afternoon, they reckon to have worked seven days in the week, and are paid accordingly; but this is never the case with labourers in husbandry. The most common number of working hours is from 13 to 14 in summer, and from the morning twilight to the evening dusk in winter.

Miners generally work two stems of six hours each per day; for which they are paid from 1*s.* to 1*s.* 6*d.* a stem.

Price of Labour by the Piece-work.

	Previous to the Dear Year of 1800.						*Since* 1800, *in some Places.*		
	s.	*d.*		*s.*	*d.*		*s.*	*d.*	
Wheat thrashed by the flail, at from	2	4	to	3	2	per qr.	4	9	with supping
Barley - - - - -	1	4	to	1	8		3	9	
Oats, - - - - - -	1	0	to	1	1		2	8	
Reaping wheat, per acre, from	5	0	to	6	0		7	6	with ale, q. s.
Mowing barley and oats	1	0	to	1	2		2	0	
Mowing hay - - -	1	4	to	2	0	now from 1*s.* 8*d.* to	2	6	
Ploughing old ley-ground per acre	9	0					11	0	
Clover-ley, or stubbles - -	8	0					9	0	
Hoeing broad-cast turnips twice	6	0					9	0	
Push-ploughing, average -	11	0					14	0	

Previous to the Dear Year of 1800.							*Since 1800, in some Places.*	
	s.	*d.*		*s.*	*d.*		*s.*	*d.*
New ditching work, at 1½*d.* per sod of 8 inches depth, per rood of 8 yards - -	0	4½	to	0	6	from 6*d.* to	0	8
New fencing upon clear ground, with strong staggards, per rood - - - -	1	4	to	1	8	from 2*s.* to	2	6

The most remarkable advance in the price of labour, is that of thrashing; wheat being above double, and barley treble, what it was nine years back. This refers only to the eastern part of the district.

Men from 40 to 60 years of age, have from time immemorial come down from Meirionyddshire, &c. into the lowlands of Denbighshire and Montgomeryshire, as professed feeders of cattle during the winter season; and are provincially styled *cowmen*. Thirty years ago, their wages from November 12th to May 12th seldom exceeded 30*s.*, with victuals; which has since been advanced to from five to six guineas.

SECT. II.—PROVISIONS.

In writing upon this subject, the feasts of opulence, and the superfluity of luxury, are entirely out of the question: the economic table of the farmer, and the humble fare of the lower class, are the present objects.

Farmers, in easy circumstances, partake with the English farmers of the produce of the land. Their tables exhibit plenty without waste; "*spare not,*" and "*waste not,*" is a motto peculiarly appropriate to their kitchens. He that partakes of their dinner, partakes of the genuine comforts of life; and needs not to hanker after the viands of the pampered epicure.

Several of the lower kind of farmers, and their dependents, have their tables as scantily supplied with the luxuries of salted bacon, butter, and cheese, as even those of the paupers they are forced to relieve. They find themselves necessitated to sell almost the whole, as the means for payments of rents and taxes. This is a gloomy picture; but it is a true copy of the original.

Articles of Provision.

Bread.—The farmers of the lower parts of Denbighshire, of Flintshire, and of Montgomeryshire, are allowed to excel in their family fare, in the quality of their bread, beef, bacon, cheese, and ale; which constitute the main support of the labouring class.

In proportion as we advance from thence into the more mountainous tracts, wheaten bread is found more and more adulterated with portions of rye and barley; until at length we arrive at places where oatmeal cake becomes its only substitute. This is the case throughout nearly the whole of the counties of Meirionydd and Caernarvon; except in genteel families, towns, and inns upon the post-roads. This bread is made by mixing oatmeal with a due proportion of lukewarm water, rolling out the dough into thin round wafers, and baking them upon iron plates, catachretically called bake-*stones*, hung over the fire. In Anglesey, some are baked on the tops of lime-kilns; and at Amlwch, on the furnaces wherein copper ore is smelted, regardless of the effect of the fumes of either sulphur or arsenic. The less the portion of water added to the meal, and the less it is kneaded, the more frangible and better will be the bread. Some add milk and butter to the composition. Bread made in this manner is greatly preferable to the fermented, thick-loaved, oat bread, made in Lancashire, and the North of England.

In this land of oats, a meal every day, all the year round, consists of a very wholesome vegetable mucilage, called *llymru*, and by a corrupt Anglicism, *flummery*. It is made by adding as much warm water to finely ground oatmeal, as it can well absorb; to which, for the first time, some sour butter-milk, leaven, or other ferment, is added; and in from three to five days' time, according to circumstances, more warm water is added, so as to render it strainable through a hair-sieve. It is then ready for use. While it is boiling, it must be continually stirred, until it attains a proper smoothness and consistence. The slight fermentation it undergoes during its infusion, gives it a pleasant acidity; which contrasts well with the sweetness of good milk, in which it is commonly eaten. English cooks prescribe other liquids, Rhenish wine, cream, and sugar; dainties which Welsh farmers know only by name.

Habits are gradually acquired, and prejudices are with difficulty removed from the human mind. Thousands of persons who seldom eat any other bread than that of oats or barley, have thousands of acres under their management, capable of bearing plentiful crops of wheat; but are so accustomed to oat-bread, that they seem prepossessed with the idea of the impracticability of growing that superior grain. If by advice or example they sow it, and the experiment disappoint them once, they attribute the cause of the failure to the soil and climate; and become more obstinately rivetted to their prejudice than ever. This failure of crop should be attributed to their own misconduct, to the weather, or unforeseen circumstances, which are frequently the lot of farmers; rather than to the nature of the climate, or the poverty of the soil they make their experiment upon. This reflection is more peculiarly applicable to Anglesey than to any other county.

Bread has too long, and too generally, been considered as the staff of life: it certainly may be dispensed with, in a much greater degree than the generality of people are willing to allow. The scarcity and dearth of bread-corn, which has of late frequently occurred, paved the way a little to the more general reception of this opinion. Gardens are, in many places, too few in number, and upon too small a scale. No cottager should be without a meal of garden vegetables every day; and in some years, when there is a stagnation in the sale of hogs, bacon is a cheap and satiating article of food, with vegetables as a substitute for bread.

The abuses of fishery should be corrected. The sea and rivers would be inexhaustible treasuries of cheap and nutritious provision to the inhabitants of this district, were the fish in the latter protected so as to attain their natural number and growth. One poacher may, by illegal practices, destroy in a month as much fish as would maintain 10,000 families for treble that space of time; were the statutes, enacted to ascertain the dimensions of net-meshes, size of fish to be taken, and the proper seasons of taking them, put in force.

By Acts of Parliament passed in the 13th Edw. I. and 13th Richard II., the salmon fishing season in the Welsh rivers, in common with those of England, is limited to the space intervening between November 12th and July 31st. However, at that time, some persons concerned had the sagacity to have the limit extended, in particular rivers, Trent, Darwent, &c. to the 8th of September: and, as late as the year 1803, some gentlemen connected with the Devonshire fisheries, observing that the periods limited by the above-named Acts, were not suited to the fisheries for salmon in the rivers Teign, Dart, and Plym; and very prejudicial to the owners of fisheries in such rivers, and to the public; procured an amendment of the Act, by which the season for taking salmon in the rivers Dart and Plym was prolonged to the 15th of November, and in the river Teign to the 4th of December.

It would have very much contributed to increase our stock of provisions, if the promoters of this partial amendment, in 1803, had made it a more national concern, and procured a regulation of the salmon fishing season through the kingdom at large: variations in time, adapted to situations and circumstances respectively, to be fixed from the reports of persons well acquainted with the subject in every part of the island. In the river Dee, the close of the season, by law, is full two months too early; the greatest quantities may be caught in the month of September, and the female roe is then small: the salmon taken in October are all males; and are then, probably, in pursuit of the females up the river: the season, therefore, ought to be extended to the beginning of October, if not further. The Severn, Conway, Dovey, &c. stand in need of similar regulations.

The *prices* of provisions must naturally be in a state of constant fluctuation; for *demand* and *supply* are two things which do not remain long in equilibrio. A calendar of them for one month, will be, like an old almanack, out of date in the next. Within these last twelve years, wheat sold at all prices from 6*s*. to 18*s*., and upwards, per bushel; and other grain, generally, in proportion at the time. Provisions, in general, are a little a little under the London prices; corn somewhat dearer, but seldom more than from 5*d.* to 6*d.* per bushel. The market of the metropolis is the *primum mobile,* and regulator, of most of the markets of the kingdom. The variation in value of the supplies of London in different places, is in proportion to their respective distances, facility or mode of conveyance, and other obvious circumstances. By such data, a table of the prices of provisions may be made, adapted to every part of the kingdom; taking the London market as the standard; and making allowances for inferior vortexes, the most populous towns, &c.

Variations in prices of the three principal grains cultivated in this district, are in proportion to the state of cultivation, population, inland or sea-coast situation, &c. of the several parts of it. By observing the market calendars for a whole year—*wheat* is found to be cheapest in Montgomeryshire, then Chester, Meirionydd, Flint, Caernarvon, and dearest in Denbighshire. *Barley*, cheapest in Montgomeryshire, then Anglesey, Meirionydd, Caernarvon, Chester, Denbigh, and dearest in Flintshire. *Oats*, cheapest in Meirionyddshire, then Caernarvon, Anglesey, Denbigh, and dearest in Montgomeryshire. These variations are easily accountable upon the foregoing principles: wheat and barley are cheapest in Montgomeryshire, owing to the great quantities of those grains cultivated there, its smallness of comparative population with Denbighshire and Flintshire, and its more inland situation. On the other hand, oats are dearest in Montgomeryshire, owing to the cultivation of that grain being more laid aside in the present rotations of crops; and also owing to greater number of horses being kept for the more distant carriage of coal and lime.

SECT. III.—FUEL.

THIS is a very dear article in the Isle of Anglesey; there being little or no wood, and scarcely any peat. The inhabitants must therefore depend upon coal, carried by sea from South Wales and Lancashire; the duty upon which, of 5*s*. 6*d*. per chaldron, advances the fuel above the reach of the poor. These, labouring under the double pressure of hunger and cold, to mitigate the rigour of the latter, are driven to expedients very injurious to the neighbouring farmers;—the collecting of the dried dung of cattle from the fields, and paring the surface of sound waste lands.

When this question was discussed, some years back, North Wales had not a Dundas to represent any part of it in the House of Commons*. Many pleas may probably be urged in favour of this tax; but more weighty ones may certainly be brought forward upon the partiality and impolicy of it. It is partial, because, owing to it, the half-starved cottagers on the sea-coasts of North Wales, far remote from any other fuel, cannot have coal under from 26*s*. to 29*s*. per ton of 32 Winchester bushels—while baronets and peers in inland parts, may have it, duty-free, from 4*s*. to 6*s*. per to of 20 cwt. In policy, it seems equal to imposing tax upon spectacles or crutches, when persons eith by age or natural debility are reduced to the necess of using them; whilst the young and healthy par the community totally escape the assessment. It se

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* The people of Scotland had interest enough to get themsel empted from this duty, at the expense of having their distilleries

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moreover, a subject worthy of consideration, whether the expense of collecting the coal-tax in North Wales does not bear very closely upon the total amount? Both gentlemen and farmers are so very averse from it, that they would rather send 20 miles by land to the coal-pits, than have that "accursed thing," the taxed coal, delivered upon a wharf close by their houses. Upon enquiry into the chief "*obstacles to improvement*" in agriculture—"*the duty upon coal*" was included in every list. Wherever there is plenty of limestone, without any fuel but taxed coal to burn the kilns, it is most certainly a very material obstacle.

The hair-breadth escape this tax had from being abolished, or rather commuted, in the last session of Parliament, is decisive as to public opinion upon the subject.

Hitherto, coal has not been worked with any profit in the Isle of Anglesey. Upon the Malldraeth, quarter and half engines are employed to drain the pits. The strata are, 1. sand, five feet; 2. freestone, 66 feet; 3. black shale, six feet; then, 4. *good coal, three feet and a half* deep; 5. indurated clunch, two feet; and lastly, as they have not sunk lower, freestone to a depth unknown. Another attempt was made to discover coal between the rivulets Braint and Caint; where the strata were, 1. peat; 2. gravel; 3. clay; 4. coal metal, or shaly clunch; with tumblers of coal interspersed irregularly, and some of several tons weight: here, they were overpowered with water, and gave up the enterprise, at 120 feet depth, after having expended 1600*l.*

The late John Wilkinson, Esq. gave it as his opinion that there was no coal, worth the sinking for, in Anglesey; but had the island been blessed with stores of iron ore, and that persevering adventurer proprietor of them, these 30 years back, it is very probable that Mona might at this day be *exporting* coal, instead of *importing* that valuable fuel. It is also urged as a discouraging symptom, that the Anglesey strata dip almost perpendicularly; but the inclination of the three feet and a half coal near Malldraeth, is reported to be only one yard in ten towards the east by south. There are but few coal-works more horizontally stratified than this: and the concomitants of coal, freestone and limestone, appear nearly horizontal in several parts of the island. The Flintshire coal strata dip under the estuary of the Dee, from one yard in four, to two yards in three; and at Llwyn y maen colliery, near Oswestry, the dip is one yard in two and an half; but all nevertheless, worked with profit.

The depth of coal found in Anglesey, in proportion to the whole depth sunk, appears favourable; by taking a comparative view of other coal-works*.

Anglesey-depth in the whole 77 feet, bed of coal $3\frac{1}{2}$ feet .... = $\frac{1}{22}$ part

St. Anthon's, near Newcastle, 150 yards, sunk through eight thin beds of coal, amounting in the whole but to $5\frac{1}{2}$ feet = $\frac{1}{81}$

Whole depth of St. Anthon's, 810 feet; five beds of coal, 22 feet .... = $\frac{1}{36}$

Montague Main, near Newcastle, depth, 725 feet; 15 beds of coal, (out of which four only are workable), 22 feet .... = $\frac{1}{33}$

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* From the Reports of Northumberland, and Salop.

Lightmoor, in Shropshire, whole depth 254 yards; 13 beds of sweet coal, 10 yards, (exclusive of several beds of culm, five yards)	$=\frac{1}{25}$
Slaney's Dawley, &c. in Shropshire, whole depth 348 feet, five beds of coal seven feet	$=\frac{1}{49}$
Waterpit on the Clee Hills, in Shropshire, whole depth 137 yards; three beds of coal, 10 feet	$=\frac{1}{41}$

Upon the whole, the general physiognomy of Anglesey seems to deserve one spirited trial, conducted with scientific skill, and with the aid of adequate hydraulic powers; to decide at once whether Mr. Wilkinson was correct in his opinion or not. A trial upon a large scale, would have, probably, another good effect, that of preventing the ruin of several petty adventurers.

Next to Flintshire and Denbighshire, Anglesey claims the third place in rank of precedency in coal mines within this district, even according to present appearances. It has all the concomitants of coal, excepting ironstone, and may have that, though not yet discovered.

The three other counties, Caernarvon, Meirionydd, and Montgomery, have hitherto been considered, as entirely destitute of coal; which is strictly true respecting the two former counties; and that of Montgomery has very little to boast of; a corner at Coedwae, near the Shropshire boundary, has a few pits capable of producing about 12 tons per day of excellent coal, though swift in burning; having its inflammable principle chiefly of carbon, with more maltha than asphalt.

Several attempts have been made to discover coal, without any rational prospect of success. Wherever a combination of iron, sulphur, &c. gives a coaly appearance to clay or shale, the vulgar opinion is, that there must be coal underneath: but without the accompaniments of coal, limestone, freestone, &c., in regular ranges, experience teaches that no coal can possibly be expected. This excludes the greater part of the district from any probability of its containing coal.

Some say, that coal lies under the surface of the whole globe; but that in some places it is too deep to be worked. This seems to be a groundless theory, and unworthy of that benevolent design of the great Creator, which is evident in all his works; as all necessary articles seem to have been placed within the reach of man. Coal with its concomitant strata are found in almost all parts, lodged upon limestone, limestone upon slate, and slate upon granite, &c. The limestone range of this district, lying under coal, has been traced, in a former section, from Alberbury in Shropshire, in a northern direction, through the eastern part of Denbighshire into Flintshire; where it makes a curve to the north-west, towards Anglesey. The inclination or dip of regularly stratified rocks is transversely, or at right angle to the line of bearing. These limestone rocks, from Alderbury to the elbow of the curve in Flintshire, bear to the north; consequently coal is to the east; *i. e.* between the limestone and the plains of Salop and Cheshire: beyond the curve, where the bearing of the limestone is north-west, the coal is also found at right angle, to the north-east, dipping under the estuary of the Dee, forming what colliers call a *trough*, and rising again on the Cheshire side, until it is entirely cut off by a cross dyke of reddish sandstone; and no more coal is to be found, in that direction, through the whole promontory of Wirral, until the Mersey be crossed into Lancashire. Upon the Dee, the Cheshire coal dips to the south-east to meet the Flintshire coal under the centre of the estuary; in fact, it is but one entire bed of coal, and worked on both sides to a great distance under the sands and tides. An army may march over a company of colliers without interrupting them at their subterraneous work, but here, a fleet may sail over them unawares.

Varieties of Coal:—1. *Cannel*, at Mostyn, Bychton, and Leeswood, in Flintshire; and at Plas Kynaston, in Denbighshire.

2. *Bituminous* coal, of various combinations.—One species called binding or caking coal, in which asphalt predominates. In burning, this bitumen causes the outside to cohere or bind, so as to concentrate the heat in the middle; rendering it thereby more useful for smiths, and less so for culinary and daily purposes. Water assists in giving it a cohesive surface, which is a practice well known to the smiths. It burns into hard cinders, which being wetted, will burn and cohere a second time. Other species, having less asphalt, exhibit varieties of fracture, and exterior characteristics, according to their respective combinations; and go by different names, *stone*, *hard*, *run-splent*, &c. These leave but few cinders; more or less ashes, do not cohere in burning, emit a clear flame, and diffusive heat; and consequently more useful for the farmer than the smith.

Thickness of Coal Seams.—Flintshire, in this respect, is highly favoured; there being few collieries exhibiting such quantities of coal within an equal depth. Near Newcastle, the coal seams, 15 in number, added together, make but 22 feet, at the depth of 725 feet. In the eastern collieries of Shropshire, the seams are commonly from six to 18 inches, and very few reach three or four feet. A bed of coal near Wednesbury, in Staffordshire, is said to be 13 yards thick; the only seam, according to present information, which surpasses in thickness those of Flintshire. The following sketch of the coal strata at Bychton near Holywell, will develope the richness of the Dee tract in this valuable commodity.

In a pit 614 feet deep, they have sunk through 27 strata; those of coal only will be here noticed: the 5th, is cannel three feet, riding upon a bed of common coal six feet, in all nine feet; 6th, coal two feet three inches; 8th, coal 15 feet; 10th, coal nine feet; 12th, cannel coal 14 inches; 14th, coal one foot; 16th, coal six feet; 19th, coal seven feet; 21st, coal three feet; 22d, coal three feet nine inches; 25th, coal three feet nine inches; 27th, coal three feet nine inches: in all, 64 feet eight inches of coal; being equal to about one foot of coal in every nine feet depth.

The strata at Bagillt, an adjoining colliery, are inserted in Mr. Whitehurst's theory.

These coal strata extend from the parish of Llanhasa, opposite the point of Air, on the north-west to the parish of Hawarden, opposite Chester, on the south-east; taking in their course the intermediate parishes of Whitford, Holywell, Flint, and Northop; and preserving the same measures, and the same regularity of succession, they pass under the Dee into Cheshire; which seems to be a fair proof of their identity, and that they are continued under the whole breadth of the estuary.

The strata dip variously from two yards in three, to one yard in seven; but in general they become more horizontally inclined in the course of their progress on the line of bearing towards the south-east. This may be accounted for by the subincumbent rocks being less precipitant in those parts than the other. Another problem for the solution of the theorist is, that seams of coal within this range, become gradually thinner as they approach the south. The thickest seam at Mostyn, &c. on the northern extremity of the range, is 15 feet; at Hawarden, 16 miles distant, 12 feet; at Brynbo, near Wrexham, it recovers its former dimension of 15 feet; then due south at Ruabon, nine feet; Chirk, seven feet; Llwyn y maen, &c. near Oswestry, six feet; and at Coedwae, near Alberbury, the southern extremity of the range, the seams are but from 18 inches to two feet in thickness.

Among uncommon appearances in the natural history of this fossil, may be included the three following: 1. The nodules of loose coal of several tons weight, in Anglesey.—2. The diagonal line of partition between a bed of smithy coal and another of cannel, at Plas Kynaston, (*See Plate* I. *Fig*. 3).—3. The six-feet seam of coal at Trevarclawdd, near Oswestry, disappearing for the space of 60 yards, and found again further on in the dip, doubled over, so as to form a bed twelve feet thick, for an equal space of 60 yards.

At the Flintshire pits, coal sold a few years back, at 4½*d*. per cwt., at Ruabon, for 3*d*., and at Acre Vair, for 2½*d*. This latter may be said to be the highest and lowest coal in North Wales; highest in situation, and lowest in price. Coals have lately been advanced from 1*d*. to 3*d*. per cwt. more than the former prices. They are still the cheapest of all fuel, even at the distance of 20 or 30 miles by land carriage.

Having dwelt so long upon *coal*, little remains to be said upon the other articles of fuel, *wood* and *peat*.

Wood was the most common of all fuel in the lowlands, and even in the wooded parts of the mountains, a century or two ago. Land then encumbered with timber sold cheaper accordingly. Now the quantity burnt as fuel is very inconsiderable, confined to mere waste, tops and pollards: and even those find other markets, when near forges for charcoal, or manufactories of the pyrolignous acid.

The places most distant from coal, must depend upon *peat* for fuel. In those parts, every farm generally has its appropriated turbary; and such as have no right of common, buy peat by the load. Peat are cut in some parts, by a measure of 150 square feet, called *gwaith gwr;* being 50 yards in length, by three bricks or spits in breadth. In other parts peat are sold by a measure called *rhaw*, being four yards square to the pole, and 15 poles to the *rhaw*,=240 square yards. The depth allowed, is 18 inches, making about 120 cubic yards. If double depth be taken, only half the surface is allowed. The price per *rhaw* is from 44*s*. to 3*l*. Price of cutting some years ago was 7*s*., now 10*s*.; harvesting and stacking 14*s*. A piece of turbary near Barmouth has been lett for ten years at 30*l*. a year; and the peat are cut therein and sold at the above rates. A canal has been cut through the turbary, and walled with stone on each side. By this means the peat are conveniently loaded into vessels, and conveyed either to Barmouth or Dolgelleu. The proprietor intends, when the lease expires, to have the whole tract improved by *warping*.

Peat are too frequently cut for fuel in meadow-grounds, at random, without any regard to the direction of the foss. This, of all others, should be called *blind* draining.

In Fens Moss, in Flintshire, peat is so soft as to require being cast into molds. When it hardens, it is highly inflammable; and is sold by the hundred in number to the townspeople of Whitechurch and Wem.

CHAP. XV.

POLITICAL ECONOMY,

AS CONNECTED WITH, OR AFFECTING AGRICULTURE.

SECT. I.—ROADS.

FIFTY years back there were, comparatively, but few miles of travellable roads within the whole district. Coal for fuel, and lime for manure, could not be carried in quantities, to any great distance. The commencement of the general turnpike Act being put in execution, was a happy era for agriculture, commerce, and every species of internal improvement. Landed property has increased in value, in several instances, ten, twelve, and thirteenfold, since that period; and that entirely owing to the opening of new roads, for the introduction of manure, and the convenience of disposing of the surplus produce of the country: places before inaccessible to wheeled carriages, were put upon a more equal footing with others that were naturally better situated.

Strangers may write rhapsodies, and some natives may be inclined to be peevish, because the roads in some particular spots are not in complete repair; but they ought to exercise a little candour towards the inhabitants of a mountainous district, who have, within such a short period, either formed new roads, or improved old ones, to the exent of *one thousand miles.*

In Anglesey, the Irish mail road, the whole length of the island, from the Menai to Holy-Head; and the roads connecting the principal towns and places of note, are in good repair; and to lessen the burden upon the public, Lord Viscount Bulkeley has lately, at his own expense, formed a new road along the beautiful bank of the Menai, from Bangor Ferry to Beaumaris.

In Caernarvonshire, the gentlemen of the county have taken a very active part in the formation of roads. They had assistance from Government to complete the most difficult part within the whole district, on the Irish road at Penmaen mawr, which was executed by Mr. Sylvester, about the year 1770. The promontory of Lleyn, consisting of good soil, was in a poor state of cultivation until within these few years, when it was for the first time introduced to the world by means of new roads; on the north-western aide, by a road from Caernarvon to Clynnog, towards Nevyn, &c.; and on the south-eastern side by another, under the direction of Mr. Madocks, from Aberglaslyn-bridge to Tre-Madoc; and then continued through the interior, to Porth dinlleyn.

The road from Caernarvon to the noted salmon leap at Aberglaslyn, being upwards of twelve miles extent, through the romantic wilds of Snowdon, was new-modelled by subscription. Here the road entered the county of Meirionydd, where, for about six miles, it was, until of late, extremely difficult of passage. The traveller was necessitated either to climb and descend alpine staircases, or to seek a guide to lead him a perilous circuit over the Traeth-mawr sands, where he was frequently incommoded and detained by the tides. The magistrates of the county obviated this obstruction by forming a new road from the boundary of Caernarvonshire to Tan y bwlch, which is now one of the most pleasant and diversified rides in the Principality. This link connected a chain of roads through the whole length of Wales, from the head of our Patron Saint in the south, to the head of Holy Cybi in the north.

Previous to the year 1785, the annual export of slates from Lord Penrhyn's quarries at Dolawen*, did not exceed 1000 tons; which, owing to the ruggedness of the road, were conveyed from the quarries to the port, a distance of six miles, in panniers on horses' backs. His Lordship formed a new road, which gave immediate employ to about 120 broad-wheeled carts and waggons; and from the quarries he extended the road nine miles further to Capel Curig, through Nant-ffranco, and the romantic interior of Snowdon, at his own expense, the whole tract being his property. It is probable that his Lordship, from the commencement of his improvement of these roads, had in view the substitution of this nearer route for the Irish mails, instead of the former one through Chester and Conway: which has since taken place. The increase of the slate trade caused his Lordship afterwards to have an iron rail-way, the length of six miles from Dolawen quarries to Port Penrhyn.

Denbighshire is the third county in the extent of its new formed roads; having within it above the sixth part of the thousand miles. During the enclosure of the wastes in the parish of Henllan, there were fifteen miles of new roads formed within its boundaries: some of them expensive. The new roads over the Green near Denbigh were estimated at 6000*l*. They are 18 feet wide, and covered the whole breadth with broken limestone from Henllan, one foot thick. The expense of carriage to the most distant parts, breaking the stone small upon the road, and levelling the same, amounted to 50*s*. per rood of eight yards.

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* The real name of the spot where the slate quarries are, is *Braich y cavn;* but *Dolawen*, being a more couth and familiar name, is here preferred.

Forming roads in Wales, along precipices, and through solid rocks, are frequently very expensive. Part of the road leading from Dolgelleu to Barmouth, cost two guineas and an half per rood. Fifty-two roods at Glyn diphwys, on the Irish road near Cerrig Druidion, cost 250*l*.; and one rood in particular, cost 30*l*.

There are scores of miles of roads in different parts, that are still in absolute want of improvement; and yet at the same time, such is the spirit of speculation and rivalship, that new roads are formed where they are not particularly wanted. Such is that now in the making between Oswestry and Corwen, over the lofty Berwyn. The present road, through Llangollen, is twenty-two miles and an half; the new road over the mountains may be about four miles nearer to a flying crow, through the air; but considering the number of ascents and descents which must unavoidably occur, to animals not supplied with wings, the old *level* road must be preferable for expedition as well as ease. The new road explores a wild and uninteresting tract of country; and unless either mines of ore, or quarries of slate, be discovered, the tolls to be raised, can hardly be expected to pay half common interest for the money expended.

The Irish mail-coach having of late taken Shrewsbury in its course instead of Chester, was to particular persons a subject of grievous concern: but the Flintshire landholders feelingly hailed the joyful day. The mail being exempted from tolls, and monopolizing nearly the whole of the passengers, reduced the tolls, in five districts, from Chester to Conway, above 300*l.* per year. The effect of this reduction was, that the tolls received were not sufficient to pay the interest of money lent on turnpike security within those five districts; and some of the securities were actually offered on sale at 50 per cent. discount. The whole expense of repairing the roads was accordingly laid on the occupiers of lands; and they were compelled to it by dint of indictment and fine; insomuch, that in the year 1791, the sum of 1080*l.* was levied upon the inhabitants, &c. of the few townships through which the road passed, within the small county of Flint; and some of the townships were inhabited only by miners and small farmers. The experiment succeeding, it was again repeated in the year 1795, on the inhabitants of Saltney township; where the occupiers of 2200 acres were fined to the amount of 400*l.*; being nearly one-seventh of the annual rent. Mr. Pennant's complaint on the subject, as inserted in public advertisements at the time, was—"We are like the Israelites, compelled to make brick without materials. The means of repairing the roads, the tolls, are taken from us; and we are fined for not performing impossibilities." These Flintshire indictments were certainly cases of peculiar hardship. Farmers, who paid tolls upon these very roads, within a few hundred yards of their respective dwellings, for bringing manure to their farms, were heavily fined for not preserving their surface smoother, for the accommodation of travellers who passed toll-free.

However well inclined persons may be to think favourably in many respects of farmers, yet in the instance of not repairing the roads, clearly incumbent upon them, betimes, it is much to be regretted that they can be so blind to their own interest, as to require and wait for the spur of an indictment, and the lash of a fine. Were one half, and in some instances one tenth of the money they are by that means compelled to pay, voluntarily and seasonably applied, they would thereby elevate themselves and their roads above the reach of the attorney and his unfeeling client. This reflection, however, does not bear upon the inhabitants of Saltney; their case was not of the common kind. The treasurer of the trust ought to have been indicted, and not the township.

The county of Meirionydd is of the greatest extent, but one, in the district; and its mountains are extensive in proportion to its cultivated lands: these are unfavourable circumstances in the formation and improvement of roads. The original expense must be great, and the tolls collected at the gates comparatively small; however, to the credit of the county, the magistrates have exerted themselves with spirit and perseverance; and have formed about 200 miles of new and improved roads within the last 35 years.

The original Welsh roads, generally ascending the brow of the hills, are strikingly descriptive of the national character. Our ancestors' method of surmounting difficulties, was more by a spirit of daringness than by craft or circumvention. Almost every valley, or dale, had its road winding along its bottom to its very extremity; and then, the rock or mountain was to be ascended, like a step-ladder, all at once. They should not, however, be accused of Celtic stupidity in this instance;

stance; the old Gothic roads in Scandinavia are probably of the same description. The roads might have been then as well adapted to the state of society, as ours are at present. These steep ascents covered their retreat in times of invasion, or of domestic broils: good roads would have hastened the annihilation of their liberty; which they so highly valued, and as strenuously defended.

Instead of roads of the above description, which may very properly be styled *flats* and *sharps*, the managers of our present improved roads have commonly, though not universally, adopted plans better suited to the exigency of the times, or the state of society, in which we live. The road now begins to ascend the side of the mountain at the lower end of the dale; and the summit is attained by a gradual and easy ascent, and as nearly as possible along an uniformly inclined plane, without losing one foot of elevation once gained. The abrupt passes of Rhiwfelen, near Llangollen, and of Oerddrws, near Dolgelleu, and several others, are exceptions to this plain rule; which must be owing either to want of money, or to confiding too much in surveyors not properly qualified for their office; which was too frequently considered as a sinecure. Judgment and integrity were two qualifications indispensably necessary in surveyors: through want of the former, they have been known to set task-work, whereby common labourers earned from 7*s*. to 14*s*. each, per day; and through want of the latter, they have too frequently dispensed with the statute-duty of particular persons, and too negligently attended to the performance of those who pretended to do it. In fact, statute-duty, in many places, has been only another name for statute knavery and indolence. Of late, these general surveyors have been discarded, and labouring surveyors are commonly appointed in every district, with a trifling advance of wages, who are always upon the road, attending the regular performance of statute-duty, &c.; by which means the state of the roads in most places is much improved.

Bridges, and other public works, are made and repaired, under the direction of county surveyors, who have fixed salaries.

Wherever a declivity favours the drying of roads, where the foundation is sound, the materials of repair convenient and durable, and the carriages light, travellers may expect good roads, and should not be disappointed. This is the case in a great part of the district. Anglesey, Denbighshire, and Flintshire, having limestone and other hard materials in abundance, and Caernarvonshire, and Meirionyddshire abounding with granite and other siliceous substances; the difficulty of preserving roads therein in good repair is much lessened: but in Montgomeryshire, the case is reversed. The main road, leading from Llanidloes to the Denbighshire and Shropshire lime-rocks and collieries, runs along flat vales; the materials lie generally at a great distance, and are, moreover, soft and perishable; and the almost constant carriage of large pieces of timber, of several tons weight, and of coal and lime in vast quantities, and from great distance, soon breaks through a covering of any thickness. Great pressure, friction, and water, will in a short time reduce shale, the most common material, to its primitive clay. In this county, all the repairs lie entirely upon the farmers, both statute-duty and tolls, as there are but few travellers and light carriages of pleasure, which make the repairing of roads so easy to the farmers in the vicinity of the metropolis, and other common residences of the great. The Montgomeryshire roads may have been represented as very *bad;* but about thirty years back they were thirty times worse. It must certainly add somewhat to the credit of the county, that since the passing of the Act, above 260 miles of turnpike-roads have been made within it. Towards forming them, subscriptions were assiduously applied for, and as liberally granted; and the land made use of was almost universally *given.*

Since the opening of the canal, land-carriage of lime, coal, and timber, in the parts bordering thereon, has been considerably reduced; and harder materials, for the repair of the roads, are conveyed thereby from a great distance.

As a new Act is expected to be framed upon the Report of the Select Committee of the House of Commons, it would be useless here to say any thing about the most unobjectionable breadth of roads—various degrees of convexity—different lengths of axletrees—premiums for drawing horses double—comparison between conical and cylindrical wheels, &c. which have all in their turns formed subjects of discussion.

SECT. II.—CANALS.

The Ellesmere Canal, which connects the rivers Severn, Dee, and Mersey, commencing from the latter at a place now called Ellesmere Port, crossing the hundred of Wirral to Chester, and from the Dee proceeding in a direction nearly south, enters the county of Denbigh near Pulford: it then crosses the Alun, and proceeds to Gwersyllt; from thence a branch turns off westernly to Brynbo iron and coal works, to Ffrwd colliery in the county of Denbigh, and to Talwern colliery and Nant y ffridd lime-rocks in the county of Flint, where it terminates in a reservoir of 82 acres; the water whereof, when necessary, is to supply the summit-level of the canal. The main trunk proceeds from Gwersyllt to Bersham iron-works; and by a connection of iron rail-roads pervading the Ruabon collieries, it appears a second time upon the Dee at Pont-Cyfsylltau, where it crosses both river and dale upon an aqueduct of the following extraordinary dimensions:

	Feet.	In.
Length of the cast-iron trough, which supports the water	1007	0
Height from the bed of the Dee to the top of the side plates	126	8
Breadth of the water-way, within the iron-work	11	10
Number of freestone pillars, including abutments	20	
Distance between the pillars at the top, being of a pyramidal shape	45	0
Depth of the iron sides of the canal	5	3
Length of the earthen embankment, formed for the carriage of the canal to the level on the south bank of the Dee	1503	0
Height of the embankment at the south abutment	75	0

The iron-work was cast in a foundery erected for the purpose on the spot; and the stones for the pillars were raised in a neighbouring quarry at Plas Kynaston.

This magnificent aqueduct was opened with great ceremony, on the 26th day of November, 1805, in the presence of about 8000 spectators.

The three great Italian aqueducts have celebrated the names of as many Roman Pontiffs, and that near Maintenon has displayed the magnificence of the Grand Monarch*; but neither of them had the principle of commerce for its foundation; in which light this aqueduct over the Dee is the first in Europe. Its expense was estimated at 40,000*l.*

On the north side of the Dee, a branch extends to Llangollen, and to the vicinity of the Oernant slate-quarries. From the end of the embankment at the aqueduct, the main canal proceeds to the west of the Park du collieries, the east of Bronygarth lime-rocks, and between Chirk Castle and village to the bank of the river Ceiriog; which, together with the dale, it crosses upon a freestone aqueduct 700 feet in length, consisting of ten arches, and 70 feet above the surface of the plain. At this place it quits the North Wales district, for a space, and enters Shropshire. Having proceeded towards Shrewsbury as far as Frankton, a branch, near that place, takes a south-western direction to Llanymyneich lime-works, where it re-enters the county of Denbigh, and where the property of the Ellesmere Canal Company terminates, and that of the Montgomeryshire commences. From the lime-rocks at this place, about two miles and a half of rail-way have been formed, for the easier conveyance of limestone into the boats. From hence the Montgomeryshire branch proceeds, and crosses the river Vyrnwy upon an aqueduct of five arches, 40 feet in each span, and 25 feet above the ordinary surface of the water; exclusive of a number of arches adjoining the aqueduct, to discharge the surplus water of floods. From thence, the canal proceeds along the Severn Vale to Welsh Pool, and towards New Town as far as Garthmill, which is the limit of its present extent. This branch may most peculiarly be styled the Agriculturul Canal: the chief articles of its import into the county being limestone and coal; and of its export, timber, grain, and the produce of the dairy. The whole expense of the Montgomeryshire Canal amounts to upwards of 70,000*l.*; including the sum of 2000*l.* expended in bringing a branch, the extent of three miles, to the village of Guilsfield.

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* Louis XIV. who built it to convey the river Bure to Versailles. See Phil. Trans. by Lowth, i. 594.

Notwithstanding the Montgomeryshire Canal being formed chiefly for the encouragement of agriculture, yet farmers are loth to grant that they derive any advantage from it. Those through whose farms it was cut, complain of loss of land, without any reduction in rent; and that their meadow grounds, lying below it, become rushy, owing to the oozing of the water. A farmer already keeping a team, would rather take it the distance of from 10 to 18 miles, to the lime-rocks or coal-pits, where he has the articles at prime cost, and superior weights or measures. But these land-carriage advantages are counterbalanced by others arising from the local conveniences of the canal. A team cannot return from the Ruabon coal-pits to the upper parts of the Vale of Severn in less than four days, exclusive of two days' rest; whereas within a moderate distance of the canal, only one day is lost, and the five extra days are gained for the necessary work of the farm. Lime, also, cannot be procured in sufficient quantity, by land-carriage, at a great distance. A farmer, who could lately procure but 14 loads in a season from the rocks, at the distance of 20 miles, and for which he paid about 10*l*., is now enabled to carry 30 loads from the canal wharf, the distance of five miles, though at the expense of 54*l*. This farmer could not carry his 14 loads with one team, in less than seven weeks; but he can carry the 30 loads in five weeks. By this means he gains 12 days to work his summer-fallow or turnip ground, and 16 loads more of lime; besides a saving in gate-tolls, ale and victual money, wear and tear of horses, gearing, waggon and wheels, towards counterbalancing the 44*l*. extra lime-bill: and if the soil he cultivates be improveable by the additional quantity of lime, he need not be long before he is fully reimbursed. Nothing, therefore, but either penuriousness, or want of foresight, will cause the farmer to prefer the distant carriage: especially if the profits of the canal venders would permit them to give equal measures of lime, and equal weights of coal, with those of the rocks and pits. One other advantage arising from the convenience of the canal is, that the farmer, within a moderate distance, is enabled to lime his Lent crops before sowing; by which means the lime becomes incorporated with the soil; and one load may have greater effect than two, spread as usually upon the growing grain.

About 37 years ago, a canal was intended to be cut along the Vale of Clwyd, from the town of Ruthin to Rhuddlan bridge; the extent of 15 miles and 70 chains. A Mr. Edson was employed as engineer. He found the fall for the first mile to be 43 feet, and for the remaining

ing 14¾ miles, 130 feet; in all 173. His estimate amounted only to 12,200*l*. It would now cost, owing to the great advance in price of labour, materials, &c. at least four times as much *. Then, a question occurs, whether a canal would be any advantage to the Vale of Clwyd. The Montgomeryshire Canal, for several years, yielded no profit to the proprietors. At present, it pays somewhat above common interest; but casual damages, repairs of locks, &c. must occasionally cause heavy drawbacks. The Vale of Clwyd exports more grain, and imports more groceries, &c. than the Vale of Severn; but in most other respects, the former stands in much less need of a canal than the latter. The Vale of Clwyd has limestone in several places, and farmers are enabled to burn sod-kilns in their own fields; it has the Flintshire coal on one side, and the Denbighshire coal on the other; but a canal passage could not be opened to either of them. What a late writer said of irrigation, may more appropriately be applied to a too forward zeal for the formation of canals (where no iron-works, mines of ores, coal, &c. require such an enormous expense and mangling of good land)—"*Men oftentimes plunge themselves into water, when they would better keep themselves out of it.*" As the rage for hydraulics may have somewhat abated, and the iron age commenced, a rail-way from the Brynbo colliery to Ruthin, would be a valuable acquisition to the Vale.

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* A second proposal for making the Ruthin Canal, was set on foot by the late Hon. T. Fitz-Maurice; which was opposed by the then proprietor of the Bathavarn estate; and afterwards a third attempt took place so late as 1807.

SECT. III. AND IV.—FAIRS AND WEEKLY MARKETS.

OUR fairs are held in the most convenient places and distances, through all parts of the district. The chief articles sold are, live stock, wearing apparel, and the immediate necessaries of life. The greatest fair in North Wales is that held at Wrexham, commencing the 23d of March, and continuing to the end of the following week. Besides the common articles of sale in ordinary fairs, all the surplusage of the clover-seed of the country is brought thither, and sold at various prices, according to the plenty of the preceding crops, from 4*d.* to 14*d.* per pound avoirdupois. In some years, a great influx of Dutch seeds lower the market exceedingly. White and yellow trefoil-seeds are sold there in great quantities. The Yorkshire clothiers, the Lancashire and Sheffield manufacturers, bring their goods thither to supply the district, and a great part of South Wales, for the whole year.

A wool-fair has been lately established at Denbigh, and held for the first time June 28th, 1808; to be continued annually. If this succeeds, it will be productive of general benefit. Similar resolutions ought to be adopted in other parts, for the most convenient disposal of the produce of the country.

Markets are fairs in miniature, in which articles of food, apparel, furniture, and luxury, are sold, or exchanged for mutual accommodation. Welsh Pool for fine flannels, Bala and Llanrwst for stockings, constitute the chief markets; indeed almost the only ones of note, upon articles of home manufacture. The web markets are held in Shropshire; to which the buying of webs by commission, in the neighbourhood of Dolgelleu, may be thought an exception. The market of Holywell, in Flintshire, is the best supplied with provisions of any in the six counties. The town and its vicinity swarm with miners and manufacturers; who, generally having a strong inclination to live up to their income, occasion a rapid circulation of property, and call for a plentiful supply in the market.

The hours of market should be limited by law: some commence at an hour when they should conclude, which serves as a cloak to ebriety, knavery, and a train of immoralities. In fine, many go to market with the moon, and return with the sun. From this, however, the Bala stocking-market is an exception in the extreme, which is generally over by morning candlelight in winter, and at all times cleared before breakfast.

SECT. V.—COMMERCE.

In comparison with Liverpool, and other commercial towns, North Wales will make but a mean figure, in this Section. Notwithstanding its present low ebb, Mr. Lewis Morris, when he published his Charts of the Welsh Coasts in the year 1747, entertained very sanguine ideas of the commercial eminence this district is capable of attaining; laying its foundation upon the numerous improveable harbours, and the internal resources of the country: and subsequent writers have implicitly copied his opinion.

"Aberdovey, Barmouth, and Pwllheli," they say, "are more fitted than famous for trade. St. Tudwal's

Road, near Pwllheli, is held inferior to none in Britain; commodious, and so extensive as to hold any number of ships; well defended by the promontory of Lleyn on one side, and by St. Tudwal's Islands on the other. By running a pier of stone from Penrhyn dû point to the northward, a good dry harbour might be made for small vessels." "Caernarvon has a very commodious haven, though impeded by a bar; but the tide rises so high here, that with proper attention, ships almost of any size may pass and repass in safety."

"Nevin, in Caernarvonshire; Malldraeth, Aberffraw, Holy-Head, Cemlyn, Dulas, and Red-wharf, in Anglesey, are only rough draughts of Nature; and were some of them improved, they would be found convenient harbours for the northern traders, when detained by adverse winds. Beaumaris had formerly good trade, which is now on the decline."

Some of these "rough draughts of Nature," pointed out by Mr. Morris, Mr. Campbell, and others, have since been improved. At Barmouth, a new embankment of stone has been erected, under the sanction of an Act of Parliament, to secure the entrance of the harbour: it was completed in 1802, and cost 1660*l.* including the expense of the Act, 220*l.* A new quay was constructed at the same time. Number of coasting vessels about 60.

In the year 1793, there were at Caernarvon 248 vessels employed in the slate trade, and 26 vessels carrying other goods: in 1796 not so many.

Nevin, otherwise Porth-din-lleyn, has been lately improved by subscription; and Holy-Head harbour is to be rendered more commodious at the expense of Government.

Port Penrhyn (formerly Aber-cegin), near Bangor, being only a small inlet, was converted by the late Lord Penrhyn into a commodious harbour, capable of admitting vessels of 300 tons burden.

At Amlwch, Art, by the assistance of the Paris Mine wealth, has overcome Nature; and, by excavating a vast rock, formed a harbour about 250 yards in length, and 40 in breadth, capable of containing 30 vessels from 100 to 200 tons burden, which are chiefly employed in the copper trade.

Conway is seated on the fine river of that name, which is about one mile broad at its mouth, and capable of taking in vessels of large size.

Rhuddlan, a small port at the mouth of the Clwyd, exports more grain than all the ports of North Wales besides.

From Holywell, Flint, and other places within the estuary of the Dee, great quantities of ores, metals, coal, and grain are exported.

Principal Articles of Importation.	*Principal Articles of Exportation.*
Groceries, and other luxuries of life. Drugs; pitch, tar, &c.	Cattle, sheep, horses, hogs, poultry.
Broad cloth, cottons, and other merceries.	Raw wool; webs, flannels, stockings.
Irish linen; flax, hemp.	Hempen cloths to South Wales.
Raw hides from Ireland.	Dressed skins; shoes; gloves, &c.
Lamb and kid skins from Italy, &c. in time of peace.	Ores of lead, zinc, and copper.
Pig-iron, to be forged malleable.	Malleable iron; cannon, &c.
Iron and steel ware.	Copper sheets, bolts, manillas, &c.
	Oak bark for Ireland.

Principal Articles of Importation.	*Principal Articles of Exportation.*
	Alder and birch bark for the dyers.
Timber from America, and the Baltic.	Timber for the navy; poles for the South Wales and Shropshire collieries.
Porcelain and other potteries.	Chert for the English potteries.
Glass.	Slate, sulphur, fire-brick; white, blue, and green vitriol; alum, potash, soda, sal ammonia, distilled lavender, pyroligneous acid.
	Ochres of different colours.
	Millstones of grit, burr, and whin.
Grain, in times of scarcity and peace, from Dantzic, and other granaries of Europe.	Grain, flour, and oatmeal, in seasons of plenty.
Hops, from the counties of Kent and Worcester.	Butter, cheese, bacon, barrelled oysters, and puffins.
	Rock moss for the dyers.

SECT. VI.—MANUFACTURES.

[The following account of the woollen manufactures was written in the year 1799; it is therefore necessary here to premise, that some alterations have since taken place. Owing to little or no exportation, webs and flannels have been reduced in price. Price of labour rises and falls with the market. It appears by the rate of weaving in 1601 (see Appendix No. XI.), that a web-piece, of the average length of 90 yards, was woven for 2*s.* 6*d.*—a high rate, compared with the price of other labour at the time. In course of time, the rate doubled; and when the following account was written, in 1799, it was from 7*s.* 6*d.* to 9*s.* When the demand still increased, and the number of weavers was not adequate, the rate advanced as high as 1*l.* 1*s.* It has since sunk to about one half. Dolgelleu webs are here exclusively to be understood. Weaving of flannels is subject to the same fluctuations, and for the same reasons. Notwithstanding such temporary stagnations in trade, carding and spinning machines continue to be erected in the most distant parts from the weaving districts, even in Caernarvonshire and Anglesey. Yorkshire manufacturers of carding machinery, go about regularly every three months to canvass fresh orders.]

The chief staple commodities of North Wales, as well as of the nation at large, are those manufactured of *wool*. The several breeds of sheep, on which this most useful article grows, have been already described in the Chapter on *Live Stock:* in this Section, some account will be given of the various uses to which it is applied, in each county of this portion of the Principality.

In *Anglesey*, the inhabitants buy quantities of the Snowdon coarse wool, at the fairs of Caernarvon, and Bangor; out of which, mixed with their own wool, they manufacture deep blue coloured cloth, flannels, blankets, &c. a sufficiency for home use, and no more. They dispose of the remainder of their wool, some to the Yorkshire clothiers at Chester fair; and, being so conveniently situated, some, as it is reported, by owling.

In *Caernarvonshire*, they apply themselves somewhat more to spinning and weaving; for, besides supplying themselves with wearing apparel, they annually send several pieces of *blue* cloth into Meirionyddshire, and of a peculiar drab-coloured cloth, called *brethyn sir fôn*, to be sold at Llannerch-y-medd fairs, in Anglesey. These cloths are generally seven-eighths of a yard wide, and sell from 3*s*. to 5*s*. per yard of 40 inches. Caernarvonshire flannels are coarse, of the value of from 1*s*. to 20*d*. per yard. The Dolgelleu manufacturers are also supplied with warp-yarn for their webs from hence.

In *Flintshire*, and the greater part of *Denbighshire*, they are still less disposed to the exercise of the wheel and the loom. They either sell their fleece wool to the manufacturers of the adjoining districts, or take it to Chester and Shrewsbury fairs, to meet the more crafty clothiers of the North.

In the other part of *Denbighshire*, in the south-west of *Meirionyddshire* and *Montgomeryshire*, the inhabitants have imbibed more of the spirit of industry; and add the profits of manufacture to the value of the raw material. Here, flannels and webs on the tenters, form a pleasing contrast with the verdure of the dales. Instead of the sullen silence of indolence—the incessant monotony of looms, fulling-mills, and other machineries, sound more grateful, and much more profitable, music, to the manufacturer's ear, than the most favourite oratorio of Handel. The articles manufactured in these three counties, are flannels, webs, and stockings.

I. The flannel district is confined to the south-west part of Montgomeryshire; extending, in length, from Dolobran on the north-east, to Llanidloes on the south-west, about 21 miles; and in breadth, from Llanbrynmair on the west to Berriew on the east, about 19 miles.

Formerly, the whole was *manufactured*, in the most literal acceptation of the term, by the tedious operation of the *hand*, by farmers and cottagers in their own houses. Of late, the powerful agency of water has been brought to their assistance; and about 40 carding, and several spinning, machines, have been erected in different parts of the county.

Beside these, there are other manufactories, upon larger scales. Several at New Town; one near Berriew; one at Welsh Pool; one on the Dulas stream, near Machynlleth, by Mr. Arthur Williams. He buys the greater part of his wool from the counties of Brecon and Radnor, in South Wales; and finds constant employment for 20 weavers: but more webs are made here than flannels. Another at Dolobran, about six miles west of Welsh Pool; built in the year 1789 on a branch of the river Vyrnwy. This establishment at one time employed about 100 weavers.

An opportunity is here afforded of correcting an error, lately become prevalent in London and several places, of confounding the Rochdale "stoved white Welch* flannels" with the Montgomeryshire real Welsh flannels; while in fact they are very different, agreeing neither in length of pieces, in quality of wool, nor in the mode of manufacture.

The Rochdale flannels never exceed 48 yards a piece; sell from 10½*d.* to 2*s.* 5*d.* per yard; have their warp sized in the weaving; are afterwards stoved with brimstone; and, owing to their being drawn finer in the thread than the coarseness of the wool will well admit of, they generally appear thread-bare.

On the contrary, the Montgomeryshire flannels are from 100 to 120, and some of the finer sort 132 yards long, and seven-eighths of a yard wide. They shrink generally about six inches in width by being milled; and are sold from 1*s.* to 4*s.* per yard. Instead of size, a glutinous kind of blueish clay is used in their weaving. They are bleached three times under the hammers of the fulling-mill; the first time with urine, the second with fullers' earth*, and the third with soap. The frize or nap is raised on them, not by carding, but by the adhesion of the several foldings, when the pieces are laid in a particular manner for the purpose. This nappiness gives them a peculiar softness of texture, arising from the quality of the wool; and renders them exceedingly well adapted to be worn next the skin of the most delicate invalid. The comfort they afford in this instance, and the general approbation of the public at large, of the united opinion of the faculty in recommending the wearing of them, may in time produce a visible alteration in the London bills of mortality.

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* There is not, probably, such a word as *Welch* in any language: it certainly is neither English nor *Welsh*.

The manufacturers are the wholesale venders of their own flannels, sending them to their dealers in different parts of the kingdom, without the intervening additional charge of commission or agency. The farmers and cottagers, who still make them in the old method, formerly brought each his own manufacture to meet the Salopian and other drapers at Welsh Pool market; which is regularly kept every alternate Monday throughout the year. Of late, a most useful set of men, although branded by our law, before the principles and theory of trade were well understood, with the odious epithet of *forestallers*—have appeared; who go about the country, and buy all the pieces they can. They seem well calculated to compel the over-wealthy drapers to allow a more regular and diffusive division of the profits of buying; while at the same time they save the indigent manufacturer the trouble, loss of time, and expense, of coming from 10 to 25 miles to market, for the sake of selling only one piece. Whether these itinerant jobbers rival their masters the drapers, in the manœuvre of the thumb and yard by measure, is a question that must not be decided at present; it may however be presumed that they do not, for they give general satisfaction to the country.

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* Fullers' earth is brought by sea from Hampshire, and sold at Machynlleth for about 3*s*. per cwt.; which is reckoned sufficient for about 23 pieces.

Several pieces of the finest flannels, measure 132 yards, and some still more; we will suppose, one-thirtieth part of the whole manufacture to be of that length, and the remaining twenty-nine parts to have 110 yards to a piece. On some market days, 500 pieces have been sold; by taking the average at 300, the annual number will be 7800 pieces. Formerly, when the market was lower, the average price of each piece was 4*l.*: it gradually rose to 5*l.*, then to 6*l.* and upwards. Of late, the different quantities and qualities of the 7800 pieces supposed to be annually sold, may have been, as nearly as can be estimated, in the following proportions:

$\frac{2}{60}$, or 260 pieces of 132 yards each, at the average price of 2*s*. 9*d*. per yard	£4719	0	0
$\frac{15}{60}$, or 1950 pieces of 110 yards, at 2*s*.	21450	0	0
$\frac{43}{60}$, or 5590 pieces of 110 yards, at 1*s*. 3*d*.	38431	5	0
7800	£64,600	5	0

Wool

Wool in the 260 pieces, 34 lbs. in each, at 2*s*. per lb.	£884	0	0
Ditto 1950 ditto 36 lbs. at 1*s*. 6*d*.	5265	0	0
Ditto 5590 ditto 42 lbs at 1*s*.	11,739	0	0
Oil to the manufacture of 7800 pieces, at 3*s*. each	1170	0	0
Soap 8*d*.	260	0	0
Fullers earth, 3*s*. to every 23 pieces	50	17	4
	£19,368	17	4

By this statement it appears that 19,368*l*. 17*s*. 4*d*. is the fair value of the unmanufactured wool, and other articles; and the remaining sum of 45,231*l*. 7*s*. 8*d*. *ought* to be the annual wages of labour: but unfortunately, the drapers reduce this annual profit of industry to 39,358*l*. 12*s*. 8*d*., by a custom of exacting a drawback of ten per cent. upon the total amount; that is, in a piece of 132 yards they pay but for 120, and in a piece of 110 yards they account only for 100. When the quantity manufactured was small, and the price low, this was a grievous tax upon industry; but now, the annual amount of the drawback makes it appear thrice more intolerable than ever; and it is high time that the poor manufacturers should awake out of their lethargy, and make a general revolt against such a barefaced imposition.

The second article of woollen manufacture, consists of what are provincially called *webs:* and by London drapers, Welsh plains, or cottons. They are a coarse sort of thick white cloth, made in pieces of from 90 to 120 yards. They are exclusively the production of *three* small districts: the *first* is the town of Dolgelleu in Meirionyddshire, and its neighbourhood of about 12 miles round; the *second* is the town of Machynlleth, and the Vale of the Dovey, in Montgomeryshire; the *third* is the district of Glynn in Denbighshire, comprehending some few parishes to the north and west of the town of Oswestry.

With respect to the quantity manufactured in each of these divisions, that in Dolgelleu and its invirons is by far the most considerable. Dolgelleu webs may be divided into two sorts; the coarsest, ¾ of a yard wide, selling from 13*d.* to 16*d.*; and the best, ⅞ of a yard wide, from 16*d.* to 2*s.* per yard. By computing that each fulling-mill out of eighteen, in the two former districts, dresses four webs per week, at an average of 96 yards to a piece, of the value of 16*d.* per yard; the annual amount will be 47,923*l.* This estimate may be presumed to be within bounds; for the common report is a thousand pounds per week.

This manufacture is of long standing, as appears by Acts of Parliament, the 1st and 3d of James I.; and by *two* orders from the Privy Council of Charles I.[*]; *one*, to the magistrates of the county of Meirionydd, in the year 1635, complaining that the Welsh cottons made at that time, were of inferior quality, compared with those of former days; and consequently injurious to the interest of the London merchants trading to France: the *other*, to the Lord President of the Marches, in the year 1637, limiting the length of the webs, and prohibiting the use of fell and lambs wool in the manufacture; which at present are found to be excellent ingredients, and in times of peace are consequently imported to Barmouth, in great quantities from Leghorn, London, and Dover. The warp is now made of the fleece wool of the country; and the woof is a mixture, containing about one-third, and sometimes one half, of lambs wool. The Italian lambs' wool, in 1795, sold at Dolgelleu for 8*l.* a pack of 240 lbs.; but since June 1796, when the French entered Leghorn, none of it has been imported, except some little in neutral vessels.

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[*] See Nos. VIII. and IX. in the Appendix.

The Kentish lambs' wool sells at Barmouth from 10*l.* to ten guineas a pack. The purchaser of the English wool enters into a bond at the Custom-house of the port where it is shipped off, whether London or Dover, in a sum double the value of the wool exported. When it has arrived at Barmouth, the collector of the customs there, sends a return to the officer of the port from whence it came, making void the obligation entered into by the purchaser. The glovers' wool, taken from the skins of the native sheep, is sold to the clothiers from 6*l.* to 12*l.* a pack, according to its quality.

The weaving of a web costs from 15*s.* to 18*s.*, according to its quality; by which the weaver generally earns no more than 14*d.* per day, upon his own victuals. The scouring and milling of a web costs from 3*s.* 6*d.* to 5*s.* The expense of working up a pack of wool into web-cloth is about 3*l.* 16*s.* The carding and spinning of the thread of the warp, which is spun somewhat slender, from the native fleece-wool, costs 18*d.* the stone of 4 lbs. The thread of the woof, having a mixture of lambs' wool, is much thicker than that of the warp, and is consequently spun for 8*d.* a stone.

The raw materials of every kind have advanced in price about one-third, within the last 12 years; however, with this, the advance of the manufactured article keeps pace. A few years before, and after the American war, this trade appears to have been carried on in its greatest extent, as to number of pieces; but now, owing to advance in price, although the quantity be smaller, the annual return of money into the district is equal, if not superior, to that of any former period. The cloth that was formerly sold at 9*d.* per yard, is now * advanced to 13*d.*; and so on in proportion.

Until within these few years, the only market for these webs was held weekly, on Thursday, at Shrewsbury; where they were exposed to sale in a hall belonging to the drapers of that town, and where no buyers but of that particular fraternity, were admitted. In this court of justice, the biddings of Monopoly were equal to dictatorial edicts; neither remonstrance nor appeal could be of any use. But lately, the manufacturers have had the good fortune of the market in their own houses, and the drapers the well-deserved pleasure of employing buyers by commission at about 1*l.* 5*s.* per cent.; who frequently purchase the pieces before they are out of the loom. Ever since that period, the face of the country has changed much for the better; the seeds of opulence seem to have taken root in the land, and the baneful effects of imposition and disappointment begin to disappear.

In those ten years of British prosperity, between the termination of the American war and the commencement of the present European struggle, the manufacturers established a warehouse at Barmouth, and from thence conveyed by sea about one-third of their manufacture annually to London. The following are extracts from the Custom-house entries at Barmouth.

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* In the year 1799.

Export of Webs.

Year.	*No. of Pieces.*	*No. of Yards.*	*Average Yards in each Piece.*
1789,	2616	247370	94½
1790,	3031	276612	91¼
1791,	2558	237596	93
1792,	2666	246802	92½
1793,	810	71232	88

The effect of the war is obvious in the decline of the export in the year 1793. In 1794 there was not a piece sent by sea; and ever since that period, they have returned to their usual method of land conveyance, which is five times as expensive; the carriage to London by sea being 4*s*., and by land 20*s*. a web. The vessels employed were from 80 to 100 tons burden, taking upon an average about 300 webs each, over a ballast of slate, or paving stones.

In the summer of 1799 there was a great complaint at Dolgelleu of the scarcity of manufacturers: the earnings of weavers, &c. being too inconsiderable to prevent their engaging in other employments. The number of perennial streams and waterfalls with which this country abounds, and the want of hands complained of, manifest both the convenience and necessity of substituting machinery for manual labour. It would therefore be a general benefit to the country, were web-cloth manufacturers established upon a large scale near the town. The place is well calculated for the cotton as well as the woollen manufacture; labour and provision, *cæteris paribus*, are cheap; and although weavers and adult labourers may have lately been scarce, yet it is asserted that there are, in the town and its vicinity, from 200 to 300 poor children without employ. The cotton company at Holywell, is said to pay 500*l.* a year for a fall upon the stream in that town, of which they make no use, in order to keep off other adventurers. If this be true, why cannot other adventurers find out places as convenient as Holywell; and where, for some length of time, provision and labour could be obtained much cheaper? The Maw is navigable within a mile of Dolgelleu. The Conwy, gliding through a most delightful valley, and receiving contributions from twelve streams within the space of as many miles, is navigable at Trevriw, within two miles of the town of Llanrwst. Llangollen Valley abounds with waterfalls; and has the advantage of the two former places, in lying contiguous to the Ruabon collieries: and to enhance further the eligibility of its situation, it is divided by the Ellesmere canal, which connects the commerce of Shrewsbury, Chester, and Liverpool. These are hints sufficient to excite the attention of any spirited adventurers*.

The webs of the districts of Dolgelleu and Machynlleth are, in the drapers' phraseology, indiscriminately styled *strong* cloth, to distinguish them from those of the Glynn district, near Oswestry, which in the same dialect are termed *small* cloth; because the pieces are about one-eighth of a yard narrower, although of the same length.

In the Glynn district are eleven fulling-mills; which from being employed in other kinds of manufacture, do not dress, upon an average, above 22 webs† per week. Each web, being supposed to be 190 yards in length, and selling from 9*d*. to 17*d*. per yard, average 14*d*. may be rated at 11*l*. 1*s*. 8*d*.; making the annual amount of the whole to be 12,679*l*. 6*s*. 8*d*.

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* A cotton manufactory has lately been erected in the Valley of Llangollen; and a woollen Manufactory near Dolgelleu—1809.

† By a web, the manufacturers always mean *two* pieces.

Expense of Materials to a Piece of 95 Yards.

		£	s.	d.
Warp, 36 lbs. of wool, at 10*d*.		£1	10	0
Woof,	37 lbs. of wool, at 9*d*.	1	7	9
	19 lbs. of combings, or flocks, at 8*d*.	0	12	8
Blubber oil		0	3	8
Weaving		0	5	6
Milling		0	1	6
Measuring, and house-room for sale		0	0	8
		£4	1	9

Instead of lambs' wool, these clothiers mix the woofing of the coarser sort of webs with flocks from the fulling-mills; and that of the finer sort with combings from Yorkshire and Lancashire, which is bought by the pack of 44 lbs., at from 7*d*. to 9*d*. per lb. The portion of flocks or combings mixed with the wool of the woof, is generally about one-third.

The market for Glynn webs is held every Wednesday at Oswestry; but attended with great inconvenience for want of a public building for them. Every manufacturer has his web in the inn where he puts his horse. Were proper application made to the Earl of Powys, it is to be expected that leave would be granted to appropriate a convenient part of the town-hall for the sale of these cloths*.

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* Application was made to the Earl, in the year 1807, and leave was granted.

Knit *stockings* and *socks*, constitute the third article of Welsh woollen manufacture. Bala is the chief market for them, as well as the centre of the circuit in which they are made; the boundary of it extending from Corwen to Bettws, Ysbytty, Llanrwst, Penmachno, Ffestiniog, Llanuwchlyn, Bwlch y groes—and from thence, along the northern side of the Berwyn hills, down again to Corwen; and including a most mountainous tract of about 18 miles in length, and 12 in breadth. They are of all sizes, and of various degrees of fineness; consequently of all prices from 6*s*. to six guineas a dozen. Some pairs have been actually sold for half-a-guinea each, and 8*s*. is a common price. When Mr. Lewis Morris, in the year 1747, estimated the weekly sale of stockings at Bala at 200*l*., they were but of low price compared with the present: 2*s*. 6*d*. a pair was then reckoned high; but now a much higher price constitutes by far the greater part of the total amount.

Thirty-four years after the date of Mr. Lewis Morris's estimate, Mr. Pennant published his Snowdonia; wherein he calculated the average value of stockings sold at Bala, at 350*l*. per week. This will produce 18,200*l*. per annum; which tallies pretty well with the information now collected. From 17,000*l*. to 19,000*l*. a year, is the account given in by the principal hosiers themselves; and there is no reason to suspect the truth of the report. The proportions of the different prices may be nearly as here stated.

12,000	pair, at the average price of 5s.	£3000	0
60,000	at 3s.	9000	0
60,000	at 1s. 4d.	4000	0
60,000	pair of children's hose, and socks, at 8d.	2000	0
192,000		£18,000	0

Out of 18 ounces avoirdupois of wool of the value of 2s., three pair are generally knit of fine stockings; and out of 16 ounces, of the value of 14d., two pair are made of a coarser sort. The average value of the raw material may be stated thus:

72,000	pair at 8d.	£2400
60,000	at 7d.	1750
60,000	at 3d.	750
	The amount is	£4900

And the remaining sum of 13,100*l.* is the wages of industry; excepting some small deduction for indigo. In the light-grey stockings, which is the general colour, the proportion of blue wool to white is as 1 to 15; and the dying may be rated at 1s. per dozen pair.

It might be expected, that the difference between the whole amount of the wool and the wages of knitting, would have been much greater; when it is considered that, in fine stockings every pennyworth of wool is converted into a shilling; but the great drawback lies in the coarser sort, where the profit of manufacture is a mere trifle, and would never answer, were not the knitting of such, the occupation of their leisure hours, in walking, or by the fire side in a long winter's night, without expense of candle, and the means of instructing children.

What has been said respecting the nappiness and soft texture of the Montgomeryshire flannels, which arise chiefly from the quality of the wool, and cannot be conveniently imitated in the English manufactories—may also be applied to the Meirionyddshire hosiery: and the wearing of them being so comfortable in winter, and universally recommended by medical writers [*], has made the call for them, of late years, become so general.

To complete this staple manufacture, a stocking manufactory, upon a large scale, should be established in the neighbourhood of Bala, for the sake of expedition and other improvements. Otherwise, we may, without any supernatural gift, prognosticate the decline of the trade; owing to the superior advantages of machinery adopted in other districts. There are opulence and foresight enough in the town of Bala, to put in execution such a plan as could not fail of being beneficial to the country in general, and to that part in particular.

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[*] One author, perhaps, excepted.

Abstract of the Prime Cost of Materials, and Wages of Labour, of the several Articles of Woollen Manufacture, according to the respective preceding Statements.

Articles.	Amount of the Annual Manufacture.	Prime Cost of the Materials.	Wages of Labour.
	£.	£.	£.
Glynn webs, or small cloth	12,679	8475	4204
Dolgelleu webs, or strong cloth	47,923	30,656	17,267
Bala stockings, &c.	18,000	4900	13,100
Montgomeryshire flannels	64,600	19,368	45,232
	£.143,202	63,399	79,803

In this table, the wages of labour exceeds the prime cost of the materials 16,404*l.* per annum; which, in comparison with the manufactures of other countries, is but a mere trifle; and not worth the recording here, had it not been intended exclusively as a stimulus to excite emulation in the indolent inhabitants of some other parts of *this* district, who sell their wool in fleeces, while a great number of them employ themselves in trifles which yield no profit. To such an inactive race, the bait of 143,000*l.* and upwards, is held out; which sum, as above stated, is received, or ought to be received, every year, by the inhabitants of those small districts for their manufactured wool.

When peace shall have restored the olive-branch to Britain, our woollen trade will become more brisk than ever. Besides the London market by sea, the manufacturers may find others in the interior of England; and send their webs and flannels, with a reduction in the expense of carriage by means of the Montgomeryshire

shire Canal, to any quarter, to meet clothiers from the North, the West, or even drapers from Germany, Russia, or America. Competition in the market is what this trade has long wanted: monopoly, with its deadly fangs, had checked the efforts of industry, and benumbed the very vitals of commercial freedom. Every well-informed person must have beheld with indignation the truth of the observation of Campbell and other political writers—that in their manufactures, "*The Welsh have the labour, and strangers the profit.*" This begets an anxiety in every generous mind, that the present race should rouse from their lethargy, and make use of the advantages which the all-bountiful hand of Nature has so profusely strewed before them. They may have their vallies as so many forests of waving corn, judiciously intermixed with pastures, covered with herds of lowing kine: they may have their hills whitened with improved breeds of sheep, to enable them to increase their manufacture in a threefold degree: they may make their mountains verdant with evergreen plantations, variegated with the autumnal russet of the deciduous oak, that valuable component in Britain's bulwark, while their bowels are pregnant with the ores of various metals: they have perennial streams issuing in every direction: and to crown the whole, the ocean offers its service, to waft their exports abroad, to return them the profits of barter, at many safe and commodious harbours; and to supply them with fish, along a line of 200 miles of beautifully variegated shores.

Every lover of his country must be happy in the expectation that the day is not far off, it is even now dawning, when the above-recited advantages will receive the attention they merit; when the united exertions and industry of above half a million * of free and active people, will be able to expunge the obloquy and derision which their circumstances have sometimes called forth from ignorant and untravelled strangers; circumstances, which frequently excited the nugatory sarcasms of pedantic tourists, and afforded fuel worthy of the caustic wit of the Dean of St. Patrick.

Of other Manufactures.

About 50 years back, a *broad-cloth* manufactory was established at Denbigh, under the firm of Mostyn, Pigot, and Co. It was carried on with spirit, giving employment to about 800 people, for some years; but owing to a dispute between the proprietors, which ended in an expensive lawsuit, the whole came to nothing. The spacious fabric built for the purpose has not since been occupied, except now and then, as a theatre, by a company of strolling players, to the great edification and benefit of the town and its neighbourhood. Had not the lawsuit dissolved the partnership, the success of the manufacture would have been extremely uncertain. The clothiers of Wilts and Yorkshire have, by means of a long establishment, such a command of opulence, expeditious machinery, and other advantages, that they can undersell, and finally ruin, any party which may set up in opposition to them. It is to be recommended therefore to the inhabitants of this district, to adhere to such manufactures as they are masters of; wherein they evidently take the lead, and may put all rivalship to defiance.

The cotton manufactories of the district are only five* in number; four at Holywell, and one near Mold; wherein about 1000 persons are constantly employed. Some of these cotton-mills are very elegant structures, five or six stories high; and were erected at the expense of from 20,000*l.* to 22,000*l.* each. For a particular account of these institutions, as well as the manufactures of copper, brass, and silk, the reader is referred to Mr. Pennant's History of Holywell. The magnet which attracted the silk-weavers to Holywell, is said to be the cheapness of provisions; being one-third lower than in London. There are several parts of this district, where provisions are considerably cheaper than in Holywell, and full as convenient for every kind of manufacture. The Vale of Llanrwst has been already mentioned, as an advantageous situation. The Conwy is navigable for small craft as high up the river as Trevriw, within two miles of Llanrwst. Perennial streams are numerous. The Vale is surrounded with mountains covered with sheep. Were the tax upon sea-coal taken off, fuel would be cheap, and manufactures would be established.

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* South Wales is to be understood as here included.

Sir John Wynne of Gwydir, who wrote the history of his own family, since published by the Hon. Daines Barrington, had it in contemplation to establish a manufactory in this vale, as appears by a letter of his on the subject, inserted in the Appendix to this Report†.

The late Hon. Thomas Fitz-Maurice, of Lleweni, in the Vale of Clwyd, in order to encourage his tenants in Ireland, and to promote the national manufacture, received his rents in brown linen; which he brought over to the bleaching-house he had erected for the purpose, about the year 1780, near Lleweni, at the expense of upwards of 20,000*l.*; the most elegant structure of the kind in Europe. For some time, about 4000 pieces were annually imported, and bleached; and the honourable manufacturer, unmindful of peerage, coronets, and noble blood, regularly attended Chester fairs in person; and, for the time, metamorphosed the brother of the Marquis of Lansdown into a linen-draper. He did this, to further the triumph of the spirit of trade and manufacture over the dregs of the feudal system; and to annihilate the prejudice of the Welsh gentry in favour of a long catalogue of ancestry, to the utter neglect and contempt of the more useful pursuits of agriculture and commerce. He thought he derived more true honour from the words "*Ballymote Manufacture*," the inscription over his linen-shop in Chester, than from the most pompous motto, in French or Latin, upon his escutcheon.

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* One has been built since in the Valley of Llangollen.

† No. III.

The bleaching work is still carried on by Mr. Dumbell, cotton manufacturer, from Warrington; and muslins, ginghams, and other cotton goods; diapers, and other linens, are finished ready for sale.

SLATES.

Argillaceous schistus are converted into slates for the roofing of houses, and other purposes, to a very great amount within this district.

In the Section on *Soil and Surface*, some account is given of the two ranges of hills wherein they are manufactured. Something more remains to be said, respecting the quality of the articles, and the quantity raised, in several of the best quarries.

Berwyn Range.

1. *Oernant*, near Llangollen, may be considered as the north-eastern commencement of the Berwyn line of of slate-quarries, which appear at various distances, in a south-western direction, from hence to the Bay of Cardigan, the extent of 50 miles. According to the arrangement adopted in the Section on Soil and Surface, this quarry belongs to the Clwydian range of hills. A branch of the Ellesmere Canal extends from the Dee aqueduct to within a convenient distance of this quarry. The slates are somewhat more durable than those of No. 2.

2: *Glyn Ceiriog* slate, exposed to the action of the sulphuric acid, shews symptoms of decomposition in four days. The quarries are within about five miles of the Ellesmere Canal at Chirk.

3. *Llangynog* slates are strong and durable; but quartzose veins pervading the whole mass of the rock, they exhibit a coarser surface than others of a more homogeneous composition. This slate resists the sulphuric acid for ten days. Some slabs contain beautiful cubes of mundic. The two quarries dispose of about a million of slates annually. Until the year 1803, they sold for 13*s*. per thousand—since, 16*s*.

It seems worthy of remark, that the strata of slate in these several quarries, and in all the intermediate ones of less note, incline or dip towards the same point; and from hence southward, the inclination is reversed. The point of division of the western and eastern inclinations is at Bwlch sych, in the parish of Hirnant, about three to the south-west of Llangynog. The slate range extends in this direction, through Llanwddyn, to Dinas

Mowddwy, Aberllefeni, Peniarth ucha, and Gogarth, on the Meirionyddshire sea-coast.

Snowdon Range.

1. The quarries at *Ffestiniog*, in Meirionyddshire, produce excellent slate; and are shipped off at Traeth bychan, near the spot where they are raised. The slates, like those of Caernarvonshire, are of various detached sizes, and titles: the ton stones weigh, upon an average, two tons per thousand; and the singles weigh half a ton per thousand.

2. *Dolawen*, otherwise Braich y cavn quarries, on the Capel Curig road to Llandegai, before the late Lord Penrhyn became possessed of them, about the year 1780, produced about 1000 tons annually, and gave employment to about 60 men. His Lordship soon found work for from 400 to 500 men, and from five to six score teams. In the year 1794, the exportation of slates amounted to 15,000 tons; in 1796, the tax upon slates carried coastwise, or exported, reduced the tonnage to 8000; and the quarrymen and carriers in proportion. At the revival of the slate trade, the yearly exports amounted to about 20,000 tons, which still continue.

3. *Cilgwyn* and *Llanberis* quarries, collectively, turn out about double the tonnage last-mentioned. The average of former prices may be about 1*l.* per ton. Slates have now considerably advanced; so that it may be concluded, without exaggeration, that no less a sum than 70,000*l.* is annually brought into Caernarvonshire for these useful articles, exclusive of the freights of coasting vessels.

In Kirwan's Mineralogy, vol. i. 236, this purple slate is inadvertently called *Anglesey* slate. According to this author's analysis, 100 grains of it contain 48 silex, 26 argil, 8 magnesia, 4 calx, and 14 iron. It resists the action of the sulphuric acid for a month, and then it begins to decompose.

4. On this range, slates have been raised, of late years, on both sides the promontory of Lleyn, on the Nanhoran and Bodegroes estates.

Slates raised in the Caernarvonshire quarries, are of the following dimensions and prices;

Names of Sizes, in the Quarrymen's Dialect.	Dimensions in Inches.	Price per 1000 in the Year 1799.			
		£.	s.	d.	
Duchesses	24 by 12	3	13	6	
Countesses	20 by 10	2	2	0	
Ladies	16 by 8	1	1	0	
Doubles	12 by 6	0	12	0	
Ton slates	large, and of various sizes	1	1	0	per ton
Patents, with square heads	....	1	7	6	per ton

The Caernarvonshire slates are exceedingly smooth grained, will split as thin as wafers; and those which are of a deep blue colour, may be the best adapted for writing slates in Europe. Lord Penrhyn established a manufactory near Bangor, where they are planed, and framed of various sizes, to the number of about 10,000 dozen per annum, and sold at the average price of 6*s.* per dozen. In August 1799, 3500 dozen lay ready in the warehouse to be shipped off for London; which, some years back, as well as other parts of the kingdom, were supplied with writing-slates from Holland. They are also sent, without frames, from Port Penrhyn, to different parts on the Continent.

Besides roofing and writing slates, the schist at Bolawen is converted also into the following articles:

1. Tomb-stones, sold at 2*s*. 6*d*. to 3*s*. 6*d*. per foot square.

2. Cases for the outside of buildings, as a defence against the weather; which, by being painted and sanded, have the appearance of freestone.

3. Dados and plinths for stables and passages;—sinkstones;—dairy tables;—sideboards;—pannels for doors, shutters, &c.;—ink-stands;—washball-stands, &c.

In all these various uses, as well as in many others, the schist may be seen in several places about Bangor, and even in London.

Other Manufactures.

1. A ropery, established at Bagillt, near Flint; for shipping, and cordage for mines and collieries.

2. *Ochre* is dug out of a mine near Lord Penrhyn's slate-quarries; then separated from its sand by grinding and successive filtrations; and at length collected in a sediment, and dried by the sun and air in summer, and upon kilns during winter. The general colour of this earth is yellow; others of various hues are ground in the same manufactory, for the use of painters; with which, in their native state, the Snowdonian shepherds mark their sheep.

3. *Skins* of the native sheep, and foreign lamb and kid-skins, are dressed, to a great amount, in the town of Dolgelleu; and sold to the glovers of London, Worcester, and other places.

4. *Dressed skins* sent from Dolgelleu, and other parts, to Denbigh, are there manufactured into shoes and gloves: the former are sent to Liverpool, and from thence to the West Indies, &c.; and of the latter,

about 7000 dozen pairs are annually sent to London, Bristol, &c.

5. On Buckley Mountain, in Flintshire, and in a few other places, fire-brick and tiles are made out of clunch, a blueish clay, found sometimes under, and sometimes over, a stratum of coal. Before the art of making them out of this material was generally known, they were exported from hence in great quantities; some even to America; but now, wherever clunch is found, fire-bricks are made.

6. The Nottingham brown earthen-ware, and other potteries, are made on the new enclosures near Mold.

7. Sal ammoniac is extracted from the offal of the Chester slaughter-houses, on Saltney Marsh, near Flint.

8. The produce of 13 acres of lavender, grown near Ruthin, is distilled in an elaboratory adjoining, and sent to London annually.

9. Pyrolignous acid, extracted from brushwood, &c. at Hope, in Flintshire, for the use of cotton-dyers.

10. Cannon, and other cylinders for water-pipes, fire-engines, &c. are cast at Bersham foundery, near Wrexham; where Mr. Wilkinson, about the year 1772, first put in practice his improvement on the Strasburg method of boring guns.

SECT. VII.—THE POOR.

Two centuries have scarcely elapsed since poverty became first perceptible as a public burden. The unfortunate found an asylum in monasteries, and the infirm drew their support from the revenues of religion.

The feudal system also, however absurd its principle may now appear to a commercial people, had, in some instances, a good effect upon national manners; and assisted in ameliorating the state of the poor. Although it has been said that the barons of old were monsters in politics, alternately the slaves and the tyrants of their sovereign; yet every baron was considered as the father and protector of his clan. His vassals, devoted to his call, after sharing with him in the toils of the field, partook of the viands of his table; and the families of the more indigent received occasional supplies from his munificence. But the policy of Henry VII., in laying the axe to the root of the feudal system, by legalizing the alienation of landed property, gave rise to a new era in the annals of civil society. A more regular division of wealth soon took place. Discreet economy, independent of ennobled descent, became the parent of opulence: the prudent vassal became a knight, and the imprudent knight a pauper. Whatever good may have accrued to the body politic by this change, the lower, or indigent class, certainly suffered by it, for a time. With the feudal system fell its concomitants —chivalry, a superlative sense of honour, and an unbounded hospitality. As soon as speculation pervaded all ranks, selfishness became naturally the predominant passion of the mind. The industrious became rich, but selfish; the indolent and unfortunate became poor and neglected; because what relief the disposition of the opulent was not inclined spontaneously to give, no law was in existence to enforce. This was a species of poverty, unknown in former ages: it either could not, or would not, relieve itself; and had no connexion with any other branch of society, then existing, to claim its support. Henry VIII., by dissolving monasteries,

nasteries, and other religious houses; and turning all the poor, supported by them, upon the public—brought the matter instantaneously to a crisis that required the interference of the Legislature. Accordingly, several compulsory statutes were then, and at different subsequent periods, enacted, for the relief of the necessitous; either by finding them employment, or by paying them occasional, weekly, or annual pittances. The national evil still gaining ground, several remedies were prescribed: alms, charitable institutions, assessments, parochial workhouses, and incorporated houses of industry, have successively been applied. Hitherto, they have all uniformly tended to increase the burden they were proposed to alleviate. Alms, and settled pecuniary allowances, are multipliers of poverty; and as De Foe has long since sagaciously observed, they hold out premiums to indolence. As poverty will increase, the public fund, or means of relieving it, must decrease in a certain proportion; which, if the progress of the evil be not retarded, must lead to a national insolvency. The labouring people may be considered as the muscles, if not the very vitals, of a state, or body politic; but many of them are not disposed to exert themselves, as long as the laws of that state compel other members to relieve them, instead of enabling such labourers to relieve themselves, by providing them employment adapted to their respective strength and abilities. The spirit of the poor laws should have but two leading objects in view—the best method of employing such of the burdensome poor as are able to work, and the best method of relieving such only as are absolutely infirm.

Parochial workhouses, and incorporated houses of industry, may suit the dispositions of the natives of the torrid zone, or the frozen regions of Lapland, who are mere animal machines, and as it were, the fixed furniture of the state; but in this temperate climate, where the fluid of the nerves, and the very blood of the veins of all its inhabitants, are impregnated with such a zealous love of liberty, they can never be the means of gaining the desired end. They are founded upon a wrong principle; a principle, which the humanity of a Wilberforce has been laudably exerted to abolish in remote parts beyond the Atlantic, and on the Coast of Guinea; but which at the same time he consents to promote at home, whenever he votes in parliament for the establishment of an house of industry. The economy of some of them may be excellent, and the state of the poor within, as far as relateth to food and raiment, be much ameliorated; but if from these improvements of the outward condition of our fellow-creatures, mental unhappiness cannot be separated, are the miserable rendered less miserable? By no means. Compulsion ever was, and ever will be, odious to the feelings of Britons.

It may be urged, that in the infancy of these institutions, discontent must naturally be expected; but that length of time and perseverance will inure even the *hyæna* to the yoke, and bring the poor to acquiesce under any kind of restraint. This might possibly become practicable in a century or two; but the physical effect it would have upon national character, ought to be taken into consideration. Were houses of industry to become general, the peasantry born and bred in them would compose a material part of our navies und armies; but its martial character would be lost: Britain might then have lion-admirals and lion-generals, but they would command herds of timid harts.

The statute of the 14th of Elizabeth, c. 5, giving power to magistrates to levy money towards relieving the poor by general assessment, does not appear to have been put in force in several parts of North Wales until the beginning of the last century; and then, the assessment, for many years, did not exceed from 1*d*. to 3*d*. per pound, at a rate less in some instances than one-fourth of the present value of land [*]. This difference from the greater part of England, must be owing to Wales having fewer manufactories, being less populous, its poor fewer in proportion, less depraved in their manners, and the disposition of the people in the whole much more hospitable. Busy commerce, and what is styled refined manners, are the banes of genuine hospitality; which is seldom found but among nations in a middle state: of this, the Irish and Welsh are living instances. In Wales, most families, until of late, were inclined to support their indigent relations, to avoid the opprobrium that any of their kindred [†] had their names entered in the parish books. At length, by our connections with the English, we borrowed their manners; changed our spirit of hospitality for modern refinement; and our poor, like those of our neighbours, were relieved entirely from the general assessments; which in many places, have advanced in a twentyfold rate, within the memory of men now living.

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[*] Mr. Erskine, in a publication entitled, "*The Police of the Poor*," states the amount of the poor-rates in Wales in 1680, at 33,753*l*.; and in the year 1776, only 40,731*l*. In both sums the author must have been egregiously misinformed; the former being much too great, and the latter much too small. The sum appropriated by him to the year 1776, may have been paid by *fifty* parishes only, out of *eight hundred and thirty-eight*.

[†] The Welsh acknowledge kindred, and formerly considered themselves bound by the ties of nature, to support their indigent relations, to the *ninth* degree *(nawved ach)*.

Mr. Pennant, in his History of Whitford, records, that "in the year 1756, William Lloyd, smith, was one of the overseers of the poor (of that parish), when the annual amount of the poor-rate was only 69*l*. 3*s*. 1*d*. He was appointed again overseer in the year 1783, when the tax had had increased to 600*l*.

In the year 1771, the poor-rates at Mold in Flintshire, did not exceed 400*l*.: from March 1796 to March 1797, the assessments within the same parish amounted to 1405*l*. 14*s*. 1¼*d*. There are instances of greater advances than either of these in several parishes, whose inhabitants now pay a shilling towards the relief of the poor, for every penny they paid forty years back. "One parish in the county of Flint, being rated for the first time in the beginning of this century, paid 35*l*. for the relief of the poor in the year 1740, and 1000*l*. in the year 1796. Another parish in the same county, about 40 years ago, levied no rate; in the year 1776 it paid nearly 800*l*., and in 1796, the sum of 1200*l*.*"

The rate, by which occupiers of land are assessed, is very unequal: on some farms it is nearly the full value, on others one-half, one-third, and some not one-fourth: houses in towns, inns, &c. frequently under one-fifth. Some persons, finding themselves aggrieved, have applied for a new valuation of lands and tenements within their respective parishes, and settled the poor-rates at one-half, or two-thirds, of the real value.

There are but few parishes within the district where the poor-rates are under 3*s*. per pound, of such old and unequal assessment; and still fewer above 9*s*. per pound; so that the average throughout the six counties, may be about 5*s.*[*]

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* From a publication on Beneficial Clubs, &c. by Edward Jones, Esq.

Some parishes have attempted to reduce the rates, by adopting some particular plans of economy. In the parish of Wrexham, they had gradually advanced to 6*s.* per pound. At the commencement of the year 1785, a perpetual overseer was hired; who, by the end of the year 1786, lowered the rates to 5*s.*, besides paying off 712*l.* of the arrears of his predecessors. In 1787 the rates sunk to 4*s.*; in 1789, to 3*s.*; where they remained stationary until 1795, when, owing to the extraordinary dearth of provisions, they were again advanced to 4*s.*; which by reckoning the rate of the assessment at one-third of the real value of property, was not above 16*d.* per pound, rack-rent. The amount of the assessment of 1795 was 1323*l.* 11*s.* 2*d.*[†]

The poor-rates in the parish of Llanbeblig, which includes the town of Caernarvon, advanced for some years at the rate of 50*l.* per annum. This alarmed the assessed inhabitants, and prompted them to establish a parochial workhouse. They accordingly rented a quadrangle of houses at 25*l.* a year; and there employed the poor in different kinds of manufacture, according to their respective abilities. Old persons, not accustomed to carding and spinning, converted old ropes into oakum for the caulking of ships; others carded the refuse of flax, and children spun it into candlewick, &c. By these means the rates were rendered stationary from 1790 to 1797, at 4*s.* per pound.

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[*] This is to be understood for the year 1799.

[†] As a continuation of the account given above, of the plan adopted by the parishioners of Wrexham, the following addition was communicated to the Writer of this Report, in 1802.

"We have one general overseer of the poor, the same who was originally appointed; and the parishioners have every reason to be satisfied with his conduct. But it is to be observed, that, in addition to the general overseer, a most useful regulation has been adopted. A committee of twelve respectable farmers and tradesmen meet once a fortnight to attend to the complaints of the poor. Every pauper is heard separately; and as his situation is known to some one or other of the committee, no imposition can take place. The rates continued stationary from 1795 to 1800; when, owing to the extraordinary dearth of that year, they advanced to 6*s.* per pound, amounting to 2155*l.* 9½*d.*; exclusive of 199*l.* 17*s.* 8*d.* issuing from lands. The disbursements of 1800 amounted to 2383*l.* 13*s.* 5*d.*; out of which, the sum of 362*l.* 7*s.* 11½*d.* was applied to the relief of distressed labourers, in rice and herrings."

Beneficial Societies have been more numerous than they are at present. An ingenious correspondent*, who has for some time paid great attention to the subject, is persuaded that were such institutions to become general, and not a member of society to be exempt from contribution, the means of obtaining a very desirable end, the reduction of poor-rates, would lie easy on the public. His own words on the subject, are here transcribed.

"It is too true, that many beneficial clubs have failed; but the causes have been various. There is one radical error in all the clubs I have examined—the allowance is too large for the capital; although several clubs have become even rich, from circumstances more fortunate than foreseen;—the healthiness of the members, and a continued accession of young members, who generally contribute long before life's decline, when chronic diseases gradually, but steadily exhaust the funds.

"I have always thought the ingenious calculations of

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* Edward Jones, Esq. of Wepre Hall, in the county of Flint, author of a pamphlet entitled—" The Prevention of Poverty by Beneficial Clubs; with Preliminary Observations upon Houses of Industry, and the Poor Laws."—1796.

Dr. Price, which Mr. Acland annexed to his attempt in parliament, too complicated for a society of unlettered men. The multifarious accounts they would require, would either involve the club in confusion, or compelled, as they must be, to keep an accomptant, he would be too great an expense upon such a fund, and might also prove too dextrous for his employers.

"I calculate upon an association of unlettered men in all cases, and some such there must be in every assemblage; and I adopt as my guide the principle they have adopted and understand—that contributing a given sum at stated times, shall after a certain period entitle them to a certain allowance, in sickness and decrepitude.

"In further considering the commencement of the contribution, I would include every child from the day of baptism.

"You will naturally ask—Who will contribute for orphans on the parish, and poor men's children?—the parish. I propose only a *gradual* reduction of the poor-rates. After the first operation of putting the able to work, the aged and infirm must be continued pensioners, including infants under nine years of age. Out of the parochial allowance of such infants there should be a drawback of a thirtieth part, to be put in the beneficial fund, until they will have become able to labour, when they or their employers, should contribute out of their earnings. This proportion would do for all children, and would serve as a rate for adults.

"Labour was in this country, forty years ago, at 8*d*. per day. The contribution to a club was then 6*d*. per lunar month, and ale, 2*d*.; amounting to 8*s*. 8*d*. per annum, a twenty-fourth part of a labourer's earnings.

The price of labour is now* 16*d.* per day, and if a poor man could then spare a twenty-fourth of his earning, he might now, all differences of relative circumstances considered, spare a thirtieth, or, in round numbers, a shilling per month; and this should be the contribution of the rich as well as the poor. Thus the whole system would be simple, from the penny of the parish orphan to the shilling of the adult. Women capable of earning 8*d.* per day, should contribute 6*d.* a month.

"A like simple rule of relief may be made. If clubs formerly could bear to pay weekly, twelve times the monthly contribution, we may now safely venture ten in acute diseases, and five in chronic cases and decrepitude."

Some years ago, when from 400 to 500 men were employed in Lord Penrhyn's slate quarries, every one was induced to become a member of a beneficial club, instituted among themselves; from the fund of which he was to receive seven shillings a week during illness. A surgeon was engaged, with a stated annual salary for attending the sick or maimed. The consequence of this association was, that not one member, however numerous his family, has from that time to this (1809), become chargeable to any parish. The late patriotic proprietor erected a place of worship near the quarries, as a chapel of ease for the use of his labourers, at the expense of 2000*l.*; which has not as yet been endowed.

In the great dearth of 1795, and in the still greater one of 1800, subscriptions were collected in every county towards supporting the poor, in order to relieve the lower class of farmers from the excessive pressure of rates.

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* This letter was dated in 1798: the price of labour has advanced about one-third since that time.—1809.

It is a public grievance, that such sums are expended in parochial lawsuits, owing to the intricacy of the law of settlements, and the manœuvre of its interpreters. Two parishes in Anglesey, a few years ago, expended 206*l.* in determining the settlement of a pauper; the winner paying 56*l.*, and the loser 150*l.*

Exorbitant as the poor-rates were within this district in the year 1798, when this Report was written, they have from that time to the present, 1801, made a rapid advance. Within these three years, some parishes were rated as low as 3*s.* per pound, and the average of the district was estimated at 5*s.*; now, the lowest rate (old assessment), is as high as 5*s.* or 6*s.*, and the average from 8*s.* to 9*s.*; some so enormous as to be from 12*s.* to 15*s.*; and one has come under observation amounting to 28*s.*; so that within such a short space this tax appears to have doubled; and magistrates and officers will not find it an easy task to reduce it, under the present system, even when times change for the better.

By the following extracts, made from the books of the overseers of the respective parishes, it will appear that neither the increase of population, nor the advance in the price of provisions, within any given period, can account for the collateral increase of poor-rates; and consequently, that some speedy and effectual remedy ought to be generally applied, to arrest the progress of the growing evil.

I. *Parish of Meivod.*

Year.		*Amount of Poor-rates.*		
1705	Poor-rates and church-rates united	£37	9	8
1761	at 6*d*. per pound, (poor-rates only)	91	15	6
1763	7*d*.	107	1	5
1765	8*d*.	122	7	4
1767	10*d*.	152	19	2
1768	1*s*.	183	11	0
1777	1*s*. 2*d*.	214	2	10
1780	1*s*. 3*d*.	229	8	9
1782	1*s*. 4*d*.	244	14	8
1788	1*s*. 6*d*.	275	6	6
1789	1*s*. 10*d*.	336	10	2
1792	2*s*.	367	2	0
1796	3*s*. 6*d*.	642	12	0
1800	6*s*. 6*d*.	1195	7	0

II. *St. Michael's.*

1765	1*s*.	£55	19	9
1783	2*s*. 6*d*.	132	12	2
1800	8*s*. 6*d*.	445	10	4

III. *Guilsfield.*

1752	6*d*.	£129	12	5
1754	7*d*.	142	9	4
1757	8*d*.	179	11	0
1791	2*s*.	537	5	4
1800	5*s*.	1341	13	4

IV. *Llan-*

IV. *Llanvyllin.*

Year.		*Amount of Poor-rates.*		
1755	at 1*s*.	£73	3	6
1770	1*s*. 9*d*.	127	1	3
1796	4*s*.	290	5	4
1799	5*s*.	358	5	1
1800	8*s*.	573	7	2

V. *Castle Caer Einion.*

1745	at 2*d*.	£9	14	11
1770	1*s*. 4*d*.	83	5	4
1782	1*s*. 9*d*.	112	6	7
1795	3*s*.	211	3	3
1798	3*s*. 6*d*.	224	19	3
1800	5*s*. 6*d*.	359	0	3

VI. *Llanidloes.*

1744	at 1*s*.	£55	4	0
1773	2*s*. 9*d*.	176	16	7
1774	3*s*. 3*d*.	193	16	9
1797	11*s*.	627	14	1
1799	14*s*.	817	9	4
1800	1*l*.	1168	9	7
1801	1*l*. 8*s*.	1634	18	9

These six parishes are situate in the county of Montgomery.

No. 1. *Meivod.*—The inhabitants are chiefly employed in agriculture and its dependent branches. The number of families relieved in the year 1800 was about 175, which at the average of four to a family, amounts to 700 persons; and by taking the population of the parish at 1600, it appears that the proportion of the persons relieving to the persons relieved, is but as nine to seven. Out of the families, 120 received weekly pay, from 1*s*. to 10*s*. per week, average 9*l*. per year; and 55, occasional relief, at the average of 2*l*. per year. The farms are of all sizes, from 30*l*. to 400*l*. per year.

No. II.—In this parish the farms are generally small and hilly; and the poor have fewer means of relieving themselves than those of No. I.

No. III. Guilsfield is an extensive and opulent parish. The inhabitants are chiefly employed in agriculture. The number of gentlemen residing upon their own estates within this parish is greater than within any other in the county. Two of the landed proprietors generally meet weekly to give directions to six officers, *i. e.* two wardens and four overseers of the poor. The rates are lower than in any other parish under observation; although the number of the persons relieved may be about one-third of the whole population.

No. IV.—Llanvyllin is a market-town, containing about 1000 inhabitants, with little trade or manufacture. There is a parochial workhouse for the reception of the poor.

No. V. is a country parish, and the inhabitants living by the produce of the soil. In 55 years the rates have advanced 33 times over, *i. e.* from 2*d*. to 5*s*. 6*d*. per pound.

No. VI.—Llanidloes has a weekly market; and the number of inhabitants, in town and country, is 2282, who are chiefly employed either in agriculture or the manufacture of flannels. The rates at present are 28 times more than they were in the year 1744; and the only apparent causes of this great advance, in addition to the high price of provisions, are first, the late introduction of carding and spinning machinery into the parish, by which many of the poor, especially women, have been deprived of their customary employment; secondly, a malignant fever, in the years 1800 and 1801, carried away many of the poor*, and caused a number of fatherless children to depend upon the parish for their whole support. The number of heads of families, and single persons, receiving weekly pay, is 265, exclusive of 10 or 12 families who have occasional relief. By averaging only three persons to a family, it appears that 828 persons are supported by the remaining 1454. The rates of this parish have been regulated by a new valuation, since the year 1801.

In these six parishes, the rate of assessment is old and unequal; some tenements charged about one half, others one-third, one-fourth, and some not above one-fifth, of their present value. In No. III. there are six officers, including the two churchwardens; which is a late regulation, in order to divide the burden of office; and, by the lessening of the overseers' districts, to render them more perfectly acquainted with the state of their respective poor. In the other five parishes, there are in each but two overseers; and all chosen annually. The rates in this parish have been regulated by consent of vestry about the year 1804.

There are but two *incorporated houses of industry* belonging to this district; excepting the parish of Hawarden, which is connected with the Chester House of Industry.

One was built, about the year 1792, near Oswestry; and to its support, the parishes of Llansilin and Chirk, in Denbighshire, have confederated with nine or ten others in Shropshire. This house is in as good repute as such an institution can admit of: the governors give universal satisfaction, and the directors are vigilant. The quotas to be paid by the respective parishes for the time being, towards the support of the house, were adjusted by taking the average of the last seven years' expenditure of each parish respectively, in maintaining their own poor at home. The advance of the quotas paid by the parishes of Llansilin and Chirk, stands thus:

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* In the year 1799, the number of births were 60, and of burials 32; owing to the fever, the births in 1800 were 48, and burials 93.

	Chirk.			*Llansilin.*		
Average of 7 years preceding the opening of the house	£182	11	6	£248	4	4
Expense of maintaining the poor in the house for the year 1795	205	7	10	279	4	10
Ditto for the year 1796	251	0	9	341	5	11
Ditto for the year 1800	296	13	8	403	7	0

The other is the Montgomeryshire House of Industry, built, nearly at the same time as that near Oswestry, upon Forden Heath, about the mid-way between the towns of Welsh Pool and Montgomery. This incorporation consists of eleven parishes and two townships; which include a tract of about 18 miles square. The progress of the poor-rates in a division of one of the united parishes, may be seen by the following extract.

Pool Middle Division.

Year.			*Amount of the Rates.*			
	s.	*d.*	*£.*	*s.*	*d.*	
1733 at	0	6 per pound	23	11	8	by an old rate.
1736			27	1	6	
1749 at	1	0	53	5	4	
1755 at	1	6	65	0	0	
1763 at	2	6	105	12	8	
1774 at	3	6	155	6	6	
1783 at	4	6	227	15	6	
1788 at	4	0	253	8	0	by a new rate, about 3-4ths of the present value.
1794		The poor received into the house.				
1800 at	12	0	866	8	0	

Being 36 times the amount of the rates in the year 1733. The present population of this division is 1311, about one-third part more than it was 60 years back: but supposing the population to have doubled, and that all the necessaries of life are now five times dearer than they were then; yet all these allowances will not account but for a very little more than a *fourth* part of the present rates. A portion of the other *three-fourths* may be considered as the effect of a cause more apparent than real, the great decrease in the value of money. The remainder must be attributed to various causes; among others, to a too general preference given by numbers of young people, accustomed to the cultivation of the soil, to other employments; under an expectation of greater ease, and better living. Their habits of sobriety and frugality are soon vitiated by bad examples, and a degeneracy of morals becomes general. On the least ideal difficulty, they feel no more reluctance in themselves to apply for parochial relief, than they do in requiring their wages for labour: they consider it as a kind of private inheritance. The increase of population, therefore, in the aggregate, multiplies the number of mouths to devour the produce of the soil; but does not, under our present system of deserting the fields for towns and manufactures, add any to the number of hands employed in its cultivation. And were the cultivation of the soil so far improved, as by a great increase of produce to keep the markets low; yet a reduction in the poor-rates would be a matter of difficulty, unless means very different from any hitherto adopted would be resorted to.

Upon a superficial comparison of the increase of poor-rates in parishes connected with the houses of industry, and others supporting their own paupers, the difference will not appear very material: but the subject is important, and deserves the strictest investigation. For instance, let us take a parish of each description; and those from the highest rated. Pool Middle Division belongs to the incorporation of Pool and Montgomery; and Llanidloes is an independent. In the latter, tenements are rated (in 1801), some at one half, some at one-third, and others at one-fifth, of the present rents: supposing these to be in equal parts, the average will be three-tenths; so that 28*s*. per pound, old assessment, will be reduced to 8*s*. 4*d*. at the present value. The new rate in Pool Middle is about three-fourths of the present value; which reduceth the 12*s*. to 9*s*. per pound. So far there appears but 8*d*. per pound in favour of Llanidloes: but how many poor families are supported, or relieved, in each of the parishes? In the year 1800, the sum of 1634*l*. was disbursed in the parish of Llanidloes, to the weekly relief of 265 heads of families, and single persons, exclusive of those who received occasional support. This does not amount to *six pounds per family*. In Pool Middle, in the year 1800, the sum of 866*l.* was raised towards the support of 46 persons in the house, 21 on weekly pay, seven receiving occasional relief, and four children at nurse; in all 78 persons, at the yearly rate of *eleven pounds each person*. None of the parishes in the incorporation are charged under 6*l.* a pauper, per annum, including out-poor who receive only occasional relief. Some parishes pay 10*l.*, some 15*l.*, others 22*l.* per pauper yearly. In one year, a particular parish had but one pauper in the house, and its quota was 70*l.*!

It must not be understood from this account, by the comparative fewness of paupers in the incorporated parishes, that absolute poverty is diminished by means of the institution. The number of poor persons relieved has evidently been reduced, by rules and regulations at first adopted, of not relieving any *out* poor; which frightened some paupers who were *able*, though hitherto *unwilling*, to work, to shift for themselves, rather than submit to be *confined* to be industrious. This was an important point gained: but many were *unable* to maintain themselves; and, unhappily, were too refractory to accept of their maintenance in the house. These necessarily commenced itinerant beggars, and got a miserable livelihood by wandering through the neighbouring parishes. It may be urged, that the inhabitants of other parishes would act improperly in relieving such vagabonds: that may be; but some persons *will* be charitable, according to their idea of charity, in spite of any combinations, or even positive law, to the contrary.

A recent regulation has been adopted, by the directors of both these houses: *out*-poor, of a certain description, receive weekly pittances, or occasional relief, at their own dwellings. By the accounts of some parishes it appears, that about one-fifth part of their respective assessments is disbursed in that way; and the remaining four-fifths are applied to the maintenance of the *in*-poor—to pay salaries—and the interests of the money expended in building; which, for both these institutions, amounted to 28,000*l*.

Humanity first dictated the regulation of relieving the out-poor; and the act cheered many a throbbing heart: but in so recurring to first principles—principles utterly incompatible with the spirit of these institutions—the effect is obvious: "A house divided against itself cannot stand." These elegant structures will become deserted fabrics; and it is to be regretted they were not erected over some powerful streams, that, in case they failed of the primary object, they might be converted into woollen, or cotton, manufactories; and then the original debts, incurred in building, might in time be liquidated, by rents amounting to eight, or from that to ten, per cent.

In whatever light these institutions are viewed—whether with respect to their moral, as well as physical, effects, upon mankind; or in regard to pecuniary economy;—there is scarcely any thing to be perceived, but degeneracy and ultimate disappointment. Persons of judgment and deliberate reflection, who once thought favourably of them, now produce reasons for their apostacy. "I had once," says a correspondent, "a good opinion of the House of Industry at Shrewsbury; but for some years past I am of another mind, both in point of expense, and the morals of the poor youth brought up there; as well as the unnatural state the old and infirm are confined to, among strangers, who cannot be supposed capable of much sympathy. Experience also teacheth us, that the children brought up in such places, when grown up, are fit only for a manufactory: and in time of war, such as we now experience, when trade is dead, or even dull—these poor creatures are turned out of their accustomed warm places of labour, and then they are not fit for out-door employments; except indeed the men become soldiers (such as they be); and the females, discarded from the manufactories, too often have recourse to prostitution*."

Finding the incorporation of parishes to produce only a multiplied expense, without any material advantage; an unwieldy assemblage of confused accounts and jarring interests; some persons have thought of the expediency of running into the opposite extreme; by subdividing large parishes into township departments, for the independent maintenance of their respective poor: imagining that overseers, acting within such reduced limits, would perceive their own particular interests more materially concerned in the practice of official economy; and would necessarily be more perfectly qualified, by near acquaintance, to discriminate between the modest applications of absolute poverty, and the more clamorous importunities of sham-necessity.

That such a division of parishes would produce the above advantages, admits of some doubt. Experience teaches, that rates are as high in separate townships as in the most extensive parishes; and were subdivisions to take place, which is very improbable, an evil would arise therefrom which would more than overbalance the whole advantages;—an increase in the number of removals, and of lawsuits respecting the settlements of the poor. Parishes cannot be divided, where mutual consent is wanting, not even by the supreme authority, without violence and oppression to some of the parties. Upon the whole, parishes in their present extent and independence, seem better calculated, under effectual regulations, to gain the desired end of reducing the poor-rates, than either of the opposite extremes, incorporations or subdivisions. The most effectual regulation which has been tried with some success, is that adopted in the parish of Wrexham, of which a short account has been already given; namely, *a perpetual overseer acting under the guidance of a committee of directors, who meet twice a month.*

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* Of the moral tendency of these institutions, see *Letters upon the Pool and Montgomery House of Industry*, published in 1801.

As the poor-rates in parishes under similar circumstances, should bear some proportion to their comparative as well as respective population; the merit of the above regulation may be tried *by comparing the poor-rates and population of the parish of Wrexham, with the poor-rates and population* of other parishes under different management.

Wrexham v. *Pool Middle Division.*

As 1311, the population of Pool Middle Division, is to 866*l.*, its poor-rates for the year 1800; so is 8399, the population of Wrexham, to 5548*l.*: but the poor-rates of Wrexham for the year 1800 did not exceed 2354*l.*; so that there is a balance of 3194*l.* in favour of its adopted regulation. Again:

As 2175, the population of Guilsfield, is to 1341*l.*, its poor-rates for 1800; so is 8399, the population of Wrexham, to 5178*l.*: which gives a balance of 2824*l.* in favour of its new system.

If this calculation be a just criterion, it may be presumed that the poor-rates in the parish of Wrexham are not above one half of what they are in most of the parishes within this district, when compared with their respective population; and this reduction of rates cannot be easily attributed to any other causes than the superior economy of the perpetual overseer; and the vigilance of the directors. This plan at Wrexham has borrowed the principle of a house of industry, in having a perpetual steward, and a board of directors; but, at the same time, it has avoided its inconveniences—confining the poor, and undergoing exorbitant expenses.

SECT. VIII.—POPULATION.

[The following account of the population of the six counties was written in the year 1799, previous to the general enumeration taken by order of Government. The numbers of persons, and acres, in several parishes, were procured, as governing principles in the general calculation.]

THE number of houses in all Wales, according to the Hearth Book of Lady Day 1690, was 77,921; which, in the proportion of five persons to a house, amount to 389,605. From various calculations, there are grounds to believe the present population to be no less than upwards of half a million; whereof South Wales may be supposed to supply about 300,000, and North Wales about 240,000

1. Mons. Necker rated the population of France, before the Revolution, at 101 persons to a square mile. North Wales contains, by Evans's Map, 3390 square miles (being 661 miles more than Templeman's Survey), and by allowing 70 persons to a mile, the population will be		237,300
2. Davenant reckoned 7¼ acres to each person throughout England, which Major Grant reduced to 4 acres. The most populous country parishes in North Wales, are known to have from 6 to 7 acres to a head, some hilly parts 15, and the mountainous tracts much more; the town and villages may bring the whole to an average of 9 acres to each person: at that rate, the population of 2,170,000 acres will be		241,111
3. The six counties contain 303 parishes; 43 of which, including towns and populous villages, at the average of 2400 to each parish, will give	103,200	
260 small parishes, at 500 each ..	130,000	233,200

Next to actual enumeration, extracts from parish registers at distant periods of time, and a comparison between the number of births and burials within such periods, are the best criteria of the increase or decrease of population. For the satisfaction of the political arithmetician, respecting this district, the following data have been collected; and all tend strongly to refute the theory of depopulation, advanced by a certain writer.

TABLE OF BIRTHS, BURIALS, &c.

County.	No. for Reference.	Names of Parishes.	Periods of Years.	No. of Births with in the Period.	No. of Burials.	Marriages.	Average No. of Births per Year.	Average No. of Burials.	Population of the respective Periods, deduced from the various Ratios of so many Persons to a Birth, to a Burial, &c.	
Anglesey -	1.	Amlwch -	10 years, from 1633 to 1642	135	—	42	13½	—	at 35 to a birth - -	472
			ditto, from 1718 to 1727	257	165	59	25½	16½	at ditto - - -	892
			ditto, from 1777 to 1786	1148	594	290	114½	59½	at ditto - - -	4007
			5 years, from 1792 to 1796	994	555	—	199	111	at ditto - - -	6965
Caernarvon	2.	Caernarvon, alias Llanbeblig	10 years, from 1739 to 1748	612	521	175	61	52	population of the 4th period, at 35 to a birth - -	3570
			ditto, from 1780 to 1789	1026	887	227	102½	88½	ditto, at 50 to a burial -	3450
			7 years, from 1770 to 1776	639	391	153	91	56	the town, by enumeration in 1791	3300
			7 years, from 1790 to 1796	714	487	214	102	69	now, several hundreds more	
	3.	Pwllheli, alias Deneio	10 years, from 1757 to 1766	252	167	—	25	16½	at 35 to a birth - -	875
			ditto, from 1787 to 1796	320	147	—	32	14½	at ditto - - -	1120
	4.	Llandegai	10 years, from 1674 to 1783	103	87	38	10	8½	at ditto - - -	350
			ditto, from 1774 to 1788	263	129	70	26	13	at ditto - - -	910
			ditto, from 1787 to 1796	373	171	68	37	17	at ditto - - -	1295
	5.	Abergwyngregin	10 years, from 1683 to 1692	120	86	—	12	8½	at ditto - - -	420
			ditto, from 1787 to 1796	135	75	—	13½	7½	at ditto - - -	472
Denbigh -	6.	Denbigh, alias Whitchurch	10 years, from 1691 to 1700	440	447	87	44	44½	of the 3d period, at 50 to a burial	3120
			ditto, from 1747 to 1756	660	500	160	66	50	622 houses, at 5 persons to each	3110
			ditto, from 1787 to 1796	788	642	161	78½	64		
	7.	Wrexham	4 years, viz. 1710-20-30-40	624	629	125	157	157	2d period, at 37 to a birth -	8362
			do. viz. 1770, 1780, 1792, 1793	903	744	195	225½	186	ditto, at 45 to a burial -	8370
									ditto, by a late survey -	8399

County	No. for Reference.	Names of Parishes.	Periods of Years.	No. of Births within the Period.	No. of Burials.	Marriages.	Average No. of Births per Year.	Average No. of Burials.	Population of the respective Periods, deduced from the various Ratios of so many Persons to a Birth, to a Burial, &c.
Denbigh -	8.	Ruabon -	11 years, from 1681 to 1691	646	607	—	58½	55	at 35 to a birth - - 2047
			ditto, from 1787 to 1797	1375	843	—	125	76½	at ditto - - - 4375
									by a late survey - - 4483
	9.	Llanymyneich -	10 years, from 1701 to 1710	107	86	—	10½	8½	at 35 to a birth - - 367
			ditto, from 1731 to 1740	128	107	—	12½	10	at ditto - - - 437
			ditto, from 1787 to 1796	219	134	—	22	13½	at ditto - - - 770
Flint - -	10.	St. Asaph -	3 years, from 1718 to 1720	96	87	—	32	29	2d period, at 35 to a birth - 2135
			10 years, from 1786 to 1795	610	420	—	61	42	ditto, at 50 to a burial - - 2100
	11.	Mold -	5 years, from 1618 to 1622	263	183	54	52½	36½	3d period, at 32 to a birth - 3648 ditto, at 60 to a burial - 3600
			10 years, from 1718 to 1727	598	586	160	59½	58½	
			ditto, from 1787 to 1796	1148	599	—	114	60	
	12.	Holywell -	3 years, viz. 1679, 1733, 1760	189	155	—	63	51½	4th period, at 36 to a birth - 4500 ditto, at 38 to a burial - 4560
			5 years, viz. 1770, 1780, 1787, 1790, 1794 -	799	630	—	160	126	
			10 years, from 1718 to 1727	754	783	247	75½	78	
			ditto, from 1777 to 1786	1252	1203	372	125	120	
	13.	Overton -	10 years, from 1727 to 1736	229	—	—	23	—	2d period, at 32 to a birth - 1200 ditto, at 60 to a burial - 1140
			ditto, from 1770 to 1779	375	193	—	37½	19	
			ditto, from 1787 to 1796	369	270	—	37	27	
Meirionydd	14.	Dolgelleu -	14 years, from 1675 to 1688	786	799	—	56	57	at 35 to a birth - - 1960
			12 years, from 1785 to 1796	912	657	—	76	54½	at ditto - - - 2660 at 50 to a burial - - 2700
	15.	Tywyn Meirionydd	12 years, from 1685 to 1696	384	343	62	32	28½	1st period, at 35 to a birth - 1120
			ditto, from 1785 to 1796	653	445	167	54½	37	2d ditto, at ditto - - 1907 ditto, at 50 to a burial - 1850

Meirionydd	16.	Bala, alias Llanykil	11 years,	from 1725 to 1735	440	363	—	40	38	1st period, at 40 to a birth	1600
			ditto,	from 1785 to 1795	517	369	—	47	33½	2d ditto, at ditto	1880
	17.	Llandrillo	7 years,	from 1790 to 1796	149	112	—	21	16	at 35 to a birth at 45 to a burial	735 720
Montgomery	18.	Welsh Pool	10 years,	from 1742 to 1751	495	411	—	49½	41	1st period, at 35 to a birth	1732
			ditto,	from 1788 to 1797	681	438	—	68	43½	2d ditto, at ditto ditto, at 54 to a burial	2380 2376
	19.	Llanvyllin	7 years,	from 1665 to 1671	241	219	—	34½	31		
			10 years,	from 1711 to 1720	398	417	—	39½	41½	4th period, at 40 to a birth	1680
			ditto,	from 1728 to 1737	402	426	—	40	42½	ditto at 53 to a burial	1696
			ditto,	from 1778 to 1787	421	321	—	42	32		
	20.	Llanvair Caer Einion	7 years,	from 1724 to 1730	254	241	—	36	34½	1st period, at 35 to a birth	1260
			10 years,	from 1748 to 1757	450	288	—	45	28½	3d ditto, at ditto	2117
			12 years,	from 1786 to 1797	726	456	—	60½	38	ditto, at 56 to a burial	2128
	21.	Llanervyl	8 years,	from 1718 to 1725	168	116	—	21	14½		
			12 years,	from 1740 to 1751	241	158	48	20	13	3d period, at 30 to a birth	885
			ditto,	from 1784 to 1795	253	188	—	29½	15½	ditto, at 57 to a burial	883
	22.	Kerry	5 years,	from 1792 to 1796	236	131	—	47	26	at 35 to a birth	1645
	23.	Llanvechain	6 years,	from 1707 to 1712	103	73	—	17	12	2d period, at 27 to a birth	337
			ditto,	from 1727 to 1732	75	75	—	12½	12½	3d ditto, at ditto	540
			7 years,	from 1779 to 1785	140	80	—	20	11	ditto, at 50 to a burial	550
										ditto, by an accurate survey in the year 1797	525
	24.	Meivod	10 years,	from 1654 to 1663	348	314	—	34½	31		
			ditto,	from 1747 to 1756	319	236	71	32	23½	2d period, at 36 to a birth	1152
			ditto,	from 1785 to 1794	450	257	123	45	25½	3d ditto, at ditto	1620
			49 years,	from 1747 to 1795	1817	1313	481	37	26¾	ditto, by an accurate survey in the year 1793	1649
			7 do.	1710-20-30-40-50-60-70	257	208	—	36½	29		
			9 ditto,	from 1780 to 1788	370	207	—	41	23		
	25.	Guilsfield	10 years,	from 1575 to 1584	403	231	100	40	23		
			ditto,	from 1585 to 1594	415	312	91	41½	31	3d period, at 35 to a birth	1315
			ditto,	from 1697 to 1706	376	332	68	37½	33	4th ditto, at ditto	2065
			ditto,	from 1787 to 1796	589	416	142	59	41½	ditto, at 50 to a burial	2075
										ditto, by enumeration	2175

County.	No. for Reference.	Names of Parishes.	Periods of Years.	No. of Births within the Period.	No. of Burials.	Marriages.	Average No. of Births per Year.	Average No. of Burials.	Population of the respective Periods, deduced from the various Ratios of so many Persons to a Birth, to a Burial, &c.
Montgomery	26.	St. Bride's	10 years, from 1677 to 1686	231	181	—	23	18	3d period, at 40 to a birth - 840
			12 years, from 1720 to 1731	225	249	—	$18\frac{1}{2}$	$20\frac{1}{2}$	ditto, at 50 to a burial - 850
			ditto, from 1785 to 1796	251	209	—	21	$17\frac{1}{2}$	
	27.	Llandysilio	10 years, from 1787 to 1796	126	107	—	$12\frac{1}{2}$	$10\frac{1}{2}$	at 40 to a birth - - - - 500 at 50 to a burial - - - 525
Additions in 1801 -	28.	Bardsey Island.	Total population in the year 1747, 40; in the year 1797, 60.						
	29.	Llanidloes -	9 years, from 1791 to 1799	503	306	—	56	34	at 40 to a birth - - - - 2240 at 67 to a burial - - - 2278 by a late enumeration - - 2282
	30.	Llansilin -	38 years, from 1760 to 1796	1197	591	—	$30\frac{3}{4}$	15	at 35 to a birth - - - - 1050 by a late enumeration - 1074
	31.	St. Michael's	70 years, from 1731 to 1800	669	433	—	$9\frac{1}{2}$	6	population by survey - - 814
	32.	Castle Caer Einion -	5 years, viz. 1700, 1710, 1720, 1730, 1740 -	57	65	—	$11\frac{2}{5}$	13	population of the later period, by 30 to a birth - - 600 ditto, by 47 to a burial - 611 ditto, by a late enumeration - 601
			5 ditto, viz. 1750, 1760, 1770, 1780, 1781 -	112	62	—	22	12	
			5 ditto, from 1782 to 1786	89	73	—	18	$14\frac{3}{5}$	
			5 ditto, from 1796 to 1800	112	74	—	$22\frac{1}{2}$	15	
			10 ditto, from 1791 to 1800	203	131	—	$20\frac{1}{3}$	13	
			29 ditto, at various periods, from 1700 to 1800 -	536	376	—	$18\frac{1}{2}$	13	
	33.	Llanwnnog	3 years, viz. 1700, 1710, 1720	72	41	—	24	$13\frac{2}{3}$	
			ditto, viz. 1730, 1740, 1750	74	45	—	$24\frac{2}{3}$	15	
			ditto, viz. 1760, 1770, 1780	113	54	—	$37\frac{2}{3}$	18	

Some Explanations of the Relative Circumstances of the respective Parishes contained in the foregoing Table.

No. 1. *Amlwch.*—The great increase of births within this parish, from 13 to 199 per annum, is owing to the influx of miners, smelters, &c. to the Paris copper mines. The great superiority of the number of births over that of burials, indicates the sobriety, and regular living of the inhabitants; and shews their good state of health, notwithstanding their being employed in such apparently unhealthy occupations.

No. 2. The town of *Caernarvon* is situate within the parish of Llanbeblig, one of the most pleasant spots in the district. In the space of 48 years, the number of births appears to have increased from 61 to 102 per annum. Here the spirit of emigration, which lately infatuated a great part of the Principality, first manifested itself in June 1797, when 14 persons fled from a country they deemed devoted to destruction, to enjoy transatlantic liberty and repose.

No. 3.—*Pwllheli* is a small sea-port, situate in the parish of Deneio, on the south side of the promontory of Lleyn. The salubrity of the air, and the wholesomeness of fish diet, are evinced by the number of births, in the last period, being far above double the number of burials: the first instance of the kind noticed under the present survey, and only two instances more have occurred, in Nos. 4, and 30.

No. 4. *Llandegai.*—The increase of annual births from 10 to 37, is owing to the slate manufacture in Lord Penrhyn's quarries.

No. 5.—This parish is commonly called by the abbreviation of Aber, lies on the Menai, just opposite Beaumaris; and is inhabited chiefly by small farmers and shepherds. The table shews epidemical diseases to be less malignant now than heretofore.

No. 6.—*Denbigh* is pleasantly situated on a limestone eminence, commanding an extensive view of the most beautiful part of the Vale of Clwyd. The number of houses in this town in the year 1699 was 330*; in the year 1797 it amounted to 622, exclusive of some lately built and then unoccupied, and some in building. In 1699, Ruthin, a neighbouring town, had 413 houses†; and it does not appear that many houses have been added to the number since that time, excepting a court of justice, and a house of correction. The spirit of chivalry seems to have dealt equally with both towns, in leaving each a remnant of the feudal system, the ruins of a castle; but the spirit of manufacture and industry seems to have exclusively taken its residence in Denbigh; from which springs its present superiority in population and opulence.

A dispensary for the relief of the diseased poor was established by voluntary subscription, in this town, in the year 1807.

No. 7.—*Wrexham* is the largest town within the district. In the first period, the number of births and

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* Lhuyd's Itinerary. Above a century before, the number of houses was nearly the same: Leland says—"There are scant 80 houses in the ould toun, and the new toun is 3 tymes as byge as the ould."—*Itin.* v. 61.

†

Welsh street - - - - -	102
Castle street - - - - -	82
Clwyd street - - - - -	109
Mwrog street - - - - -	120
	413

burials is equal; in the second period, increase of population advances but very slowly. Tippling may be the deleterious cause, as there are 55 licensed ale-houses in the parish. The equality of births and burials, according to the statement in the table, drawn from the church register, may be more apparent than real, as there are four or five dissenting congregations in the parish, who may be less scrupulous in funeral than in baptismal ceremonies.

No. 8. *Ruabon.*—The increase of annual births from 58 to 125, is owing to collieries within the parish, which have been worked upon a large scale ever since wood ceased to be the common fuel of the country. This register is a voucher, that working under ground in collieries is not so prejudicial to health as Lord Monboddo, and other theorists have imagined.

No. 9. *Llanymyneich.*—Population appears to have doubled in this parish within the present century; which must be chiefly attributed to the lime trade, and mines of lead and zinc ores.

No. 10.—*St. Asaph*, being a bishop's see, has the appellation of a city. It is situate between the streams of the Clwyd and the Elwy, in the most fertile part of the vale. From its being on the border of the latter river, it is called by the Welsh, Llan Elwy; and its English name is derived from its second bishop, Hassa, the successor of Kentigern, or Cyndeyrn, the founder of the see, about the year 560.

In the table, the annual average of births appears to have nearly doubled since the year 1720; which must be owing to improved agriculture more than any other cause; for there are no manufactures, and the town is but small. The buildings of note are the cathedral, and the palace built by the late bishop Bagot.

No. 11. *Mold.*—This town, in the 16th century had not above 40 houses*. In 1699, the number amounted to 120†. At present, the town and parish contain upwards of 600 houses. The situation appears to be healthy, the proportion of births to burials being as 114 to 60. Of the longevity of the inhabitants, an instance occurs in the register: from the 9th of January 1786, to the 15th of February following, 10 persons were buried, whose ages put together, amounted to 755.

No. 12.—*Holywell*, like Amlwch, abounds with miners and manufacturers; but the proportion of births to burials in each is very different. In Holywell, in the 4th period, they are so near an equality as 12½ to 12: the proportion of Amlwch is as 12½ to 7; therefore, its increase of population is nearly double that of Holywell. Yet Mr. Pennant states, in his History of Holywell, that "though the number of apprentices in the cotton works has not been less than 300 for these seven years past, they have buried but seven;" which is only one out of 300 annually: therefore the killing principle seems to be want of regimen in adults.

No. 13.—*Overton* is an elegant village, situate on an eminence, above the fertile banks of the Dee, in the hundred of Maelor, a detached part of Flintshire; and on the post-road leading from Shrewsbury to Wrexham. The rural elegance of the situation, and the salubrity of the air, prove the taste of several genteel families who come there to reside. In the second period, the number of births is nearly double the number of burials. The following extract from the register, shews the longevity of the inhabitants.

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* Leland.—*Itin.* v. 37. † Lhuyd's Itinerary.

In

			Years.
In 1788	8	persons were buried, whose ages amounted to	656
1789	11	ditto	881
1790	5	ditto	398
1791	9	ditto	708
1792	3	ditto	238
1793	7	ditto	545
1794	7	ditto	534
1795	9	ditto	709
1796	4	ditto	299
1797	5	ditto	414
	68		68)5382
		Average age of each person	$79\frac{10}{68}$

From the 24th of September 1791 to the 23d of February 1792, 16 persons died of the small-pox, whose ages were as under:

1	at	6 months	1	at	7 years
2	—	9 —	1	—	10 —
1	—	11 —	2	—	19 —
3	—	1 year	1	—	22 —
1	—	4 years	1	—	26 —
1	—	5 —	1	—	37 —

No. 14.—*Dolgelleu* is seated in a narrow vale, at the northern skirt of Cadair Idris, and on the river Gwynion, a branch of the Maw, which enters the sea at Aber-Maw, *vulgò* Barmouth, about 10 miles distant. It is evident the Romans had nothing to do in the ground-plan of this town. The houses are just in the same or-

der as the Tartars pitch their tents, when returning from a predatory excursion. However, population gains ground; not so much in the number of births, as in the means of preserving alive those who are born. In the last century, burials to births were as 57 to 56; in the present, as 54 to 76.

A retailer of *bon mots*, richer in raillery than candour, said of Dolgelleu, that "to be made a good town, the houses should be burnt, and the inhabitants hanged." Bloody Jefferies himself, in his western campaign under James II. could hardly have pronounced a more humane sentence.

No. 15.—The advance in the population of *Tywyn* had its rise in improved agriculture; and from the village becoming a town, in consequence of its being the resort of a great number of strangers in the bathing season.

No. 16.—*Bala* is a neat small town, at the outlet of the lake called Llyn Tegid; which in English maps and topography, is unaccountably called *Pemble* mere, being, it may be presumed, the gibberish word for *Penllyn* mere; Penllyn being the name of the hundred, which had its name originally from the lake itself. The annual number of births has advanced only seven in about 60 years; and the number of burials is stationary. But church registers may mislead the political arithmetician, where schism has a numerous party: and whether the proximity of a lake of about 12 miles in circumference, in a cold climate, may not affect the scale of longevity, is a question; for intemperance cannot be here accused of curtailing the thread of life.

No. 18.—*Welsh Pool*, a well built town, consisting of two streets, crossing each other at right angles, is situate near Powys Castle, on the northern side of the fertile vale of Severn. In the register, the births to the burials are as three to two: formerly, as the case was in general, the numbers were much nearer an equality.

Among several public works lately completed in this county, is a town-hall at this place, built by the subscriptions of a few gentlemen, for the purpose of easing the county of a rate. It consists of a commodious corn-market place, a separate apartment for the sale of other articles, and a spacious court of great sessions. On the second floor is the county-hall room, 64 feet long, 25 broad, and 18 high; with a grand-jury room adjoining. In the large room the flannel market is held, once a fortnight, on Monday.

No. 19.—Neither the Army, Navy, London, or any other place, have been much indebted to Llanvyllin for a supply of men; for how many sovever it emits, it requires nearly an equal number in return, from other parts, to support its own population. Upon an average of 122 years from 1665 to 1787, the number of births to that of burials is as much upon an equality as 39 is to 37; although both soil and climate combine to render the spot salubrious. The inhabitants of the stocking district in Meirionyddshire, go bare-legged themselves, in order to accommodate strangers with the best of their manufacture. The disposition of the inhabitants of this parish is just the reverse; they enjoy the first-fruits of their own manufacture. Llanvyllin has always been noted for brewing the best ale within His Majesty's dominions; and consequently, the spirit of malt may with certainty be pronounced to be the *anaretta* *, or destroying angel, of the place. From the year 1728 to 1737, the number of births was 402, and of burials 426. Of late, the brewers have combined to draw their ale smaller; and consequently, the proportion of births to burials has been advanced to the common standard of four to three.

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* According to Arabian Philosophy, every person has his Anaretta and Alchochodon; his destroying and guardian angel.

In the register occurs an instance of the longevity of a married pair. Their day of marriage was Sept. 1, 1733, and they were both alive in 1798, the man in his 96th, and his wife in her 89th year.

Nos. 20, 21, and 22, shew the regular progress of the increase of population in country parishes.

No. 23.—The population of *Llanvechain* was accurately taken in 1797. One hundred and seven families, inhabiting 100 houses, amounted to 525 persons; being just 5¼ persons to a house: their occupations coming under the following denominations:

Farmers, married, 26, with their wives	52
Ditto widowers	4
Ditto bachelors	1
Ditto widows	1
Labourers in husbandry, married 32, with their wives	64
Ditto widowers	3
House mates, married, 3, with their wives	6
Ditto bachelors	2
Paupers, widows	18
Ditto spinsters	1
Artificers, married, 19, with their wives	38
Ditto unmarried	5
Innkeepers, 2, with their wives	4
Professor of music, 1, and wife	2
Carried over	201

Brought forward	201
Millers, 2, and their wives	4
Clergyman	1
Sexton, and wife	2
Sons, with their parents	106
Daughters, with ditto	116
Men-servants	50
Maid-servants	43
Insane persons, one of each sex	2
Males 259 Females 266	525

The acreage of the parish is about 3700; a little more than seven acres per head.

No. 24.—The number of births within the parish of *Meivod*, in the third period, is nearly double that of burials; being in the proportion of 90 to 51.

As a refutation of the reveries of the author of Thelyphthora, the champion of polygamy, it is worthy of remark, how near the number of females born, is to that of males, within any given space. Within the parish of Meivod, in 96 years, taken at four different periods, from 1654 to 1795, there were christened 1869 males, and 1710 females; which divided by the number of years, will give the average of $19\frac{1}{2}$ males and $17\frac{13}{16}$ females per year. The average of births in seven years, viz. 1710, 1720, 1730, 1740, 1750, 1760, and 1770, was $19\frac{3}{7}$ males, and $17\frac{3}{7}$ females; and in nine years, from 1780 to 1788, the average of males was $20\frac{7}{9}$ and of females $20\frac{1}{9}$. This small superiority in the number of males, which may be nearly proportionate throughout every part of the globe, may have been designed by Providence as a supply for the several callings and casualties to which they are peculiarly exposed;

posed; and, consequently, more subject to sudden deaths than the other sex.

In Guilsfield, an adjoining parish, the proportion has been nearly the same. In 40 years, taken at four several periods, from 1575 to 1796, there were 970 males and 813 females baptized; the annual proportion being as 24 to 20. As to the number of each sex buried, the case is generally reversed, in country parishes, owing to the greater emigration of males than females into other parts. In the above period of 96 years, 1485 males and 1571 females were buried, in the parish of Meivod; the annual average being 15½ males and 16$\frac{7}{10}$ females. In Guilsfield, in the aforementioned space of 40 years, the numbers of each sex buried, were nearly equal; the annual average being 16¼ males and 16 females.

The population of the parish of Meivod was accurately taken in the year 1798, when 293 houses were found to contain 1649 inhabitants, being upwards of 5½ persons to a house. The number of farmers, labourers, artificers, &c., may be nearly in the same proportion as in No. 23; and in all country parishes, where agriculture is the main pursuit.

No. 26.—*St. Bride's* is the only parish observed within the district, to have its births and burials registered according to the plan adopted in some parts of England about the year 1759; and appointed, by government authority, to be correctly kept throughout the kingdom of Sweden, since the year 1755*.

The heads of the columns in both registers are as follow.

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* See Phil. Trans. vol. lxv. Part 2.

I.	II.
1. Name and surname of the child.	1. Name and surname of the deceased.
2. Name of the father and mother.	2. Relation, addition, or profession.
3. Place of abode of the father and mother.	3. Place of abode.
4. Addition, or profession.	4. Age.
5. Child when born.	5. When died.
6. When baptized.	6. Of what disease.
	7. When buried.

Although this plan may be known all over the six counties, yet it is here inserted as a memento, that it may be recommended and adopted within every parish; especially the mode of entering burials; which, when correctly kept*, and compared with diaries of the seasons, local and relative situations, and other circumstances, may afford a fund of materials to those who study the natural history of man.

In the register of baptisms, a distinction between the day when born, and when baptized, seems to be the most material point to be observed, in addition to what is commonly entered in every register: the maiden name of the mother might also obviate some cases of dispute respecting right of inheritance. To see that births be methodically registered, is the province of lawyers; and deaths should be left to the care of the pupils of Galen and Paracelsus.

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* By the ministers, and not by sextons.

Observations deduced from St. Bride's Register.

In two periods, from 1759 to 1767, and from 1783 to 1796, being 23 years, were buried 86 persons at and above 70 years of age, of the following denominations:

Denomination.	No.	Ages put together.	Age of the Youngest.	Ditto of the Eldest.	Average.
Married men ..	16	1246	71	89	77⅞
Married women	14	1032	70	80	73 5/7
Widowers......	23	1864	70	96	81 1/23
Widows	31	2511	70	100	81
Spinsters	2	160	76	84	80

In the 16 intermediate years between 1767 and 1783, the denominations of the persons buried were entirely omitted; but in 13 years of that space, wherein ages were specified, the numbers of both sexes that reached the septuagenal period were as under:

Men .... 23—ages put together 1778—eldest 86—average 77 7/23
Women .. 34 .... 2691 .... 96 ...... 79 5/34

From the 20th of April, 1785, to the 2d of January, 1791, were buried 96 persons, who died of the following evident, and supposed, diseases:

Infants, of convulsions, &c.	6
In child-birth	1
Small-pox	6
Fevers	26
Rheumatism	1
Colic, and visceral disorders	3
Dropsy	3
Consumptions, and premature decays of Nature	31
Old age	17
Doubtful, and omitted	2

No. 28. *Bardsey*, an island on the Caernarvonshire coast, is about a mile and a half long by a mile broad. Its population in the year 1740 was 40 persons, and its rent 40*l*. It is lett at present for 100 guineas; and in August 1798, there were 10 houses inhabited by 60 persons. It is extra-parochial, exempt from both tithes and taxes. The inhabitants have their births and burials registered at Aberdaron, from which they are separated by a rapid channel five miles broad; and their market-town is Liverpool, above 50 miles distant. The products of the island are cattle, sheep, potatoes, oats, and barley.

In the parishes inserted in the aforegoing table, population is almost uniformly upon the advance; and the cause of its appearing retrograde, during some particular periods, may be explained. In the parishes of Meivod, Guilsfield, and St. Bride's*, the numbers of births, in the earlier part of the eighteenth century, are inferior to those of preceding periods; and can be accounted for by a chapel of ease having been built, about the close of the seventeenth century, at Penrhos, where the three parishes meet; and where many of the most contiguous inhabitants have ever since registered their baptisms and burials.

It remains to be remarked, that the registers from which these extracts are taken, have every appearance of having been correctly kept. Others have been observed of a different stamp; upon which no reliance could be placed, and from them no extracts were made. It is to be wished their custody were taken from the hands of careless sextons, whose orthography may frequently puzzle the most profound decypherer.

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* Nos. 24, 25, and 26.

Some Materials for a Table, shewing the Locality of Epidemical Diseases; and that Years fatal to Population in some Parts, are favourable to it in others.

Parishes.	Years fatal.	No. buried.	Years favourable.	No. buried.	Observations.
Dolgelleu	1675	103	1679	39	
	1789	74	1793	34	
Llandrillo	1794	21	1795	6	
Tywen	1696	48	1689	7	
	1785	94*a*	1791	12	*a* Whereof 35 were buried in the month of April.
Pwllheli	1763	33	1761	9	
Caernarvon	1747	88	1748	39	
	1788	134*b*	1787	46	*b* Whereof 66 were infants.
	1789	109	—	—	
Llandegai	1674	20	1675	2*c*	*c* Average of the decade, $8\frac{7}{10}$.
Denbigh	1691	111	1692	37	
	1750	80	1752	42	
	1794	76	1796	44	
Amlwch	1792	148	1795	82*d*	*d* Average of 5 years, 111.
St. Bride's	1727	33*e*	1726	16	*e* Six in April, and six in September.
	1729	41*f*	—	—	
	1795	22*g*	1793	11*h*	*f* Seven in August, and 12 in September.
Wrexham	1770	249	1792	161	
Llanervyl	1721	21	1720	6	*g* Whereof only two were above 70.
	1722	20	1723	10	
	1744	15	1745	6	*h* Whereof six were above 70.
	1746	16	—	—	
Welsh Pool	1747	70	1748	32	
	1796	54	1797	37	
Guilsfield	1587	56	1588	14	
	1795	50	1794	29	
Llanvair	1749	38	1750	17	
	1790	43*i*	—	—	*i* Whereof 12 died in April and May.
	1792	69*k*	—	—	
Llanvyllin	1669	48	1670	17	*k* Whereof 60 died from Feb. 5th to Sept. 30th.
Overton	1791	40	1790	10	
Mold	1727	100	1726	59	
Llanidloes	—	—	1620	24	
	1793	51	1795	22	
	1800	93	1798	20	

Since the passing of the Population Act, more satisfactory light has been thrown upon the subject. The returns for North Wales amounted to 252,785; which in proportion to the acreage is as 1 to 8; and not as 1 to 9, as conjectured in the foregoing calculation in 1799.

The Editors of Rees's New Cyclopædia quote Houghton (in *acre)*, that in Flintshire there are 51 acres to each house; and in Meirionyddshire 193 acres. Such a ratio reduces the population to less than one half of what it is now ascertained to be. According to the number of persons returned, and the number of acres by Mr. Evans's Survey, the following is the proportion of acres to each person in the several counties:

	Acres.
Flintshire	4⅓ +
Anglesey	5 +
Denbigh	6½ —
Caernarvon	7½ +
Montgomery	10¼ —
Meirionydd	14½ +

In the total amount of the population of England and Wales, the number of males exceeds that of females; in Wales alone, the amount appears reversed: and is owing probably to the Welsh militia being quartered in England at the time. In all the registers examined for the sake of enlarging on the subject of this Section, the births of the sexes, upon an average of from 10 to 20 years, &c. are remarkably equal: the majority, if any, is on the male side.

CHAP. XVI.

OBSTACLES TO IMPROVEMENT.

IT was supposed by an ingenious foreign writer*, that the Hercules of ancient mythology was no other than the symbol or genius of agriculture; and that his twelve labours represented—the clearing of woodlands—the draining of marshes—the irrigation of parched lands—the fertilizing of sterile soils by tillage and manure—the destruction of noxious, and the subjugation of useful, animals—and such other feats as rendered those who performed them worthy of immortal honour. If this allegory will bear application, Hercules must not rest on the summit of high Olympus; there remain for him labours yet unachieved; and, among others—the removal of the obstacles to improvement, which exist within this district.

"Moles, small birds, and magpies," are included, by some writers, in the catalogue of obstacles; but would probably, be found wrongly accused, were the great chain of the economy of nature philosophically examined. Naturalists furnish us with numerous instances of the utility of several animals, which we too hastily throw into the class of vermin. Speculative men differ widely as to the number of natural evils: some cynics multiply them *ad infinitum;* but upon more mature and profound reflection, they might be reduced to a very few.

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* M. de Gebelin, in his *Le Monde Primitif.*

The *real* obstacles to improvement have been occasionally touched upon in the different Sections of this Report: some are local, others general.

Bleakness of exposure, owing to the want of fences and plantations, and the coal-tax, are evils peculiar to Anglesey, and the maritime parts of the counties of Caernarvon, Denbigh, and Meirionydd.

Stony soils, which would require a sum double their fee-simple value, when improved, to render them arable—are insurmountable obstacles, and retain waste several thousands of acres in the hilly parts of the district.

Want of travellable roads, great distance from lime, and deficiency in the quantity of other manures—impede the progress of improvements in other tracts.

That long leases are obstacles to improvement, may seem a paradox; but to prove the fact, many estates in England, as well as Wales, may be instanced as cases in point, when in the possession of a particular description of men.

Non-residence of proprietors is too general, and too obvious in its effect.

Overvaluing of land by strangers, who do it at something like a per-centage upon the advance; and that frequently, without making any allowances for relative situations.

Want of mutual confidence between landlord and tenant.

Contested county elections, carried on with a spirit of inveteracy, and other circumstances which may render proprietors averse from reciprocal accommodations in the sale or exchange of mixed property, as well as from a concurrence in promoting general improvements.

Want of power in magistrates to compel refractory persons to open their main drains, or water-courses, instead of the present hapless expedient of having recourse to an action at common law*.

Too firm an adherence to superstitious customs †: men capable of conviction should be reasoned out of their error, and fools laughed out of their folly. All these are obstacles, and some of them easily removeable.

But the task of diverting the superabundant streams of wealth from their present wayward channels, "to make plenty smile o'er desart waste"—to enclose the open and common lands—to cause a spirit of improvement to pervade the whole, which would require ten times the capital now bestowed upon agriculture—are labours truly herculean. Want of capital in the farmers, is the obstacle of obstacles; remove that, and others will be easier removed. The effect of that want is shewn in the Section on Leases.

Were the deficiency of capital supplied, another obstacle would present itself—the want of hands: we need men, as well as money, to carry on extensive improvements. Although the annual increase of population within the six counties may be rated at about

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* Such an offender against the public good may be indicted at the Court Baron, and fined in a sum not exceeding 40*s*. twice in the year, until his refractoriness become more pliant: but if the patient still continue obstinate, his case will require a larger dose of emollients from the Court of Great Sessions.

† Such as not killing hogs, or sowing some particular grains at the new moon; and not castrating lambs when the sea flows, &c. &c.

2600*; yet very near that number yearly emigrate, and much more on seasons of emergency to supply the calls of the state, and to recruit populous towns and manufactories, especially that charybdian gulph, the metropolis, so deservedly called by writers, "the grave of the human species." Agricultural population, therefore, is inadequate to a general improved cultivation.

There are numbers of beings who ought to be *members*, and not *excrescences* of the community. The vagrant act should be put in force more rigorously. Pedlars of all kinds should be taxed so high as in effect to be prohibited. Society stands not in need of such men: they should be compelled to enlist as volunteers under the deserted banners of agriculture. The sea-coasts and rivers swarm with half-starved fishermen; and were the abuses of fisheries corrected, we might be more amply supplied by one-tenth of their number. In some places, in the harvest season, one man might do the work of three, were scythes used, to the total exclusion of reaping-hooks, excepting for wheat. Cradled scythes †, such as are called Silesian scythes in the Repertory of Arts ‡, are well adapted to cut most kinds of grain, in the neatest manner. It would be well worth the while of the farmers of Meirionyddshire, and other places, whose labourers are unaccustomed to mowing, to get men from the lowlands of Denbighshire or Montgomeryshire, to teach them the use of the scythe: Mr. Corbet found this to be absolutely necessary, when by draining and irrigation he had trebled his crops of hay.

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* This is found, by dividing the total population by 34 for births, and by 54 for burials, which seems to be a fair average throughout the district; and taking the surplus of births for the annual increase.

† *Pladuriau ar gyglau.* ‡ No. XXV.

CHAP.

CHAP. XVII.

MISCELLANEOUS OBSERVATIONS.

SECT. I.—AGRICULTURAL SOCIETIES.

THE modern Druids of Anglesey, in priority of institution, claim the lead: and they surpass those of the ancient fraternity in their attempts to improve the cultivation of their once famed Mona. Instead of assembling in the sacred groves of the Menai, around massy *cromlechs* reeking with the blood of victims, in imitation of their ancestors; they now meet in a place more congenial with the tenets of novel Druidism, the inn at Beaumaris; where the arch-druid and his conclave decide the claims of competitors to prizes proposed by them the preceding year; such as for the greatest number of roods of quicksets, planted in three rows; for the best crop of turnips; for the greatest number of acres of moory, or springy land drained; and such other necessary improvements: but what gave this Society the greatest credit in the eye of philanthropy, is their premium for saving sufferers in cases of shipwreck upon the coast of Anglesey.

2. The Farmers' Club, a society of from 10 to 15 members, in the Vale of Clwyd, meet monthly, to report progress for reciprocal information. Two of their late resolutions were, 1st, to establish a wool-fair at Denbigh, on the 28th of June in each year; and 2dly, to

change the commencement of the year of servants from the 1st of May to the 1st of January: both of these are well calculated for the public good. Fairs for the disposal of the produce of every country, should be established in the most convenient places within that country.

3. In the year 1796, an Agricultural Society, consisting of about 100 members, was established at Wrexham, under the presidency of Sir W. W. Wynn, Bart. The boundary of the district wherein the premiums of the Society are claimable, is the circumference of a circle whose diameter is 40 miles, taking Wrexham for the centre. The premiums are, as usual, divided into classes: the 1st and 2d, regard tillage; the 3d and 4th, live stock; the 5th, 6th, and 7th, bees, and cottage industry; the 8th, 9th, 10th, and 11th, rural and domestic economy, labour and sobriety of the poor. The premiums are from one to five guineas to tenants; and silver medals, when the prizes are claimed by the proprietors of their own farms.

As an auxiliary to this Society, the patriotic Baronet, in the year 1806, instituted an annual show of cattle at Wynnstay, where premiums are adjudged for the best of every species of stock; as well as for ploughing within the season, the greatest number of acres, with two horses a-breast, without a driver, in the most approved manner.

4. In the year 1802, an Agricultural Society, called the Meirionyddshire, was founded at Dolgelleu, under the patronage of Sir R. W. Vaughan, Bart. member for the county. A wise regulation has been adopted by this society, viz. that of proposing a premium for the best green crop, turnips, &c. in every hundred of the county separately, as well as for the county at large;

which, considering the existing difference in soil, situation, &c. puts the competitors more upon an equality for a fair start.

Another society was proposed to be established in the eastern subdivision of this county, in 1808, to be called the Penllyn and Edeyrnion Agricultural Society.

5. The Caernarvonshire Agricultural Society, founded in 1807.

6. The Anglesey Agricultural Society, instituted in the year 1808.

These several county societies are well supported and attended by their respective members; and it is to be hoped they will persevere in their laudable undertakings, until their beneficial effects will become evident in every department of rural economy. The two latter societies have adopted a prudent regulation, in proposing premiums to tenants for several kinds of improvements, to which landed proprietors have no claim. This is but fair: it answers no good end to match Merlins against Arabians.

Flintshire and Montgomeryshire are blanks in this Section.

Exclusive of public societies, premiums for the encouragement of agriculture are given by private individuals.

Sir John Williams, of Bodelwyddan, Bart. has for some years distributed premiums annually among the most deserving of his tenants.

The Dean of St. Asaph has endeavoured to rouse the farmers of the parish of Rhuddlan out of their lethargy. He gives five guineas for the best crop of turnips; and three guineas for the best crop of wheat upon a fallow, manured only with lime compost. All the competitors share of the feast, on the day of decision; and the victors, beside their premiums, have the honourable distinction of being crowned with the garlands of Ceres, by some of the ladies present. This stimulus, small as it may appear, compared with the exertions of large societies, has had great effect in exciting a spirit of improvement: by its means, lime compost has become the general manure for grain in that neighbourhood; and, consequently, the farm-yard produce is preserved entirely for grass-lands.

SECT. II.—WEIGHTS AND MEASURES.

The evil arising from a variety of weights and measures, is more imaginary than real. The difficulty of reducing them to the Exchequer and Winchester standards, for the information and accommodation of strangers, may be one of the greatest causes of complaint. Every person concerned is acquainted with the local weights and measures of the district wherein he has commerce; and can readily reduce them to those of another neighbouring market.

The inhabitants of Anglesey and Caernarvonshire, would not be at all embarrassed by the introduction of the Winchester measure. Their measure is in fact the same, and only expressed by different denominations; as appears by the following table.

Quarts	Gallon	Kibin	Bushel	Stored	Hobed	Peget, or a Winchester quarter.
4	1					
16	4	1				
32	8	2	1			
64	16	4	2	1		
128	32	8	4	2	1	
256	64	16	8	4	2	1

In Lleyn, Pwllheli market, &c. the subdivisions of the peget are the same in quantity; and differ only in names.

In the above table, the Anglesey and Caernarvonshire hobed is equal to four Winchester bushels. The Denbighshire, Flintshire, and Meirionyddshire hobed, is different, though called by the same name, containing only 80 quarts; so that two of the latter hobeds are equal to five Winchester bushels.

In Montgomeryshire, a cylindrical vessel, containing 20 quarts, is called a *hoop*[*]; two of such hoops make a strike or measure; and two strikes or measures make a bushel of 80 quarts, equal to a Denbighshire hobed. A bushel of oats, at Welsh Pool, is seven hoops or half-strikes, heaped. A bushel of malt is nine-tenths of the corn-measure. In different markets, the hobeds vary from 80 to 84 quarts: and some inn-keepers, it is said, have different measures in the same market-town; wishing at one time to please the buyer, and at another time the seller. Some strikes are said to be only seven-eighths of the 40 quarts.

Thus it appears that there are, in fact, but two kinds of corn-measure in the six counties; although disguised by different denominations and subdivisions.

In the Vale of Clwyd, and a part of Flintshire, although grain be nominally sold by the hobed measure, yet it is virtually sold by weight; excepting barley to the maltsters, which is always measured, allowing a scorage, or 21 hobeds for 20. When farmers sell their wheat to the Liverpool dealers, it is generally weighed in sacks of one hobed and a half each; and if such a sack do not weigh 13 score, the deficiency is noted, and a drawback is accordingly made in the payment. Deducting 4 lbs. tare allowance, the farmers give 170 lbs. 10 oz. for every 80 quarts of wheat; which must be a great loss to them, unless they have a price far superior, in proportion, to that at Mark-lane market.

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[*] The common Welsh name for its contents, is *peccaid.*

Some writers quote the statute 31st of Geo. III. and say that a Winchester bushel of wheat should weigh 57 lbs.; of barley, 49 lbs.; of oats, 38 lbs. Other writers say that a bushel of wheat should weigh 60 lbs.; of barley, 50 lbs.; of oats, 40 lbs. All this is arbitrary and vague speculation: different soils, climates, seasons, winnowing and cleaning, will give different weights. Where are the standard weights and measures? Neither at Winchester, nor at the Exchequer. How much is a bushel? So many cubic inches. How much is an inch? So many barleycorn lengths. How much is the length of a barleycorn? An indefinite part of infinite space.

However, if we fix upon the same standard, and suppose that the Liverpool dealers buy grain in the Vale of Clwyd, &c. in proportion to the market price at Mark-lane, the farmer's loss will be considerable, amounting to a full eleventh part of the whole quantity of wheat sold; which, in fact, is permitting a second tithe to be taken of all his wheat; whereas, were he to sell by measure, his loss, by customary scorage, would not be above one part out of 21, or about one half of his loss by selling by weight. The corn-dealer has nothing more to say in his own defence, than that he buys so much weight for so much money; without any reference to measure, or to the market price at Mark-lane: and if the farmer is befooled, it is his own fault.

The corn-dealer's method of selling wheat at Liverpool

pool is by a bushel of 70 lbs., which is nearly equivalent to half a hobed, according to the supposed statute weight.

Eight of the despotic Kings of France failed, successively, in their attempts to reduce the various weights and measures of that kingdom to a certain standard. We seldom hear of it in Britain, save when grain and other articles of provision are extremely dear; when the public mind is in too great a ferment to admit of any innovations. If it be at all practicable, it must be when the market is in its lowest ebb, and the people least jealous of an infringement upon their ancient customs.

Land-Measure, &c.

The vulgar notion of a Welsh mile is both extravagant and indefinite. By reference to the Welsh Laws, new modelled by Howel in the tenth century, the definition of a mile is there attributed to Dyfnwal, before the birth of Christ; and said to be as followeth: three barleycorns in an inch; three inches in a handsbreadth; three handbreadths in a foot; three feet in a pace; three paces in a leap; three leaps in a ridge of land; and one thousand ridges of land in a mile;—hence the term *milldir*, or a thousand ridges. By the foregoing definition, a Welsh mile is equal to three miles six furlongs twenty-seven poles and fifteen yards English.

The Welsh acre has been variously represented. Some say it was equal to two of our present statute acres; but no such an acre is to be found, either in use or upon record. The measure which directed the size of the acre was a rod or pole, equal in length with the long yoke of 12 English feet, which was to be held by the driver in one hand, his arms fully extended, and his other hand upon the middle knob or staple of the yoke of the fore-oxen. This done on the right hand as well as the left, constituted the breadth of the *erw;* and could not well exceed 36 feet. A question may arise as to the length of the *erw*, whether it was to be 30 times the length of the long yoke, 360 feet; or 30 times the whole breadth of the *erw*, 1080 feet. In the former case, which Wotton adopted in his translation of the Laws of Howel*, the *erw* was only 1440 square yards; a quantity too small for a day's ploughing, even of a Welsh team: in the latter case it would amount to thrice as much, or 4320 yards, which seems to be the true Welsh acre; and three-fourth parts of it, or 3240 square yards, is to this day in common use by paring and burning, and is called a *'stang*. The present denominations of the subdivisions of a *'stang*, are four square yards and a half to a pole, provincially called a quart; and 160 quarts to a *'stang;* being somewhat above two-thirds of a statute acre. The *cyvar*, or small acre, now in common use in the agricultural phrase of Meirionyddshire, and the western part of Montgomeryshire, &c. like the *'stang*, consists of 4½ yards square to the quart, and 120 (instead of 160) quarts to the *cyvar;* being 2430 square yards, or 10 yards above half a statute acre. By this *cyvar*, the common farmers regulate their sowing, liming, &c. in those parts. The Anglesey and Caernarvonshire acre is of equal quantity with the *'stang*, but differently denominated. There, 4½ yards square make a *paladr*, or perch; 30 perches a *llathen*, and 5⅓ *llathen* a *cyvar*, or acre, of 3240 square yards.

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* Leges Wal. p. 280.

Hedging, ditching, draining, and such work, when done by task, is generally by the rood of eight yards.

A yard of cloth, &c. in Anglesey and Caernarvonshire, is 40 inches. Hay is frequently sold in both counties by the yard of 38 inches in length; the buyer guessing at the quantity in the stack by the breadth and depth. In Meirionyddshire, about Dolgelleu, and other places, a stack of hay about three yards wide, and from three to four high, will sell, in general, at about 50*s*. per yard of 36 inches in length; and so on, varying according to dimensions and quality from 2*l*. to 4*l*. per yard. But this random method of buying and selling hay, is gradually giving way, in every part, to the more certain and satisfactory method by the hundred or ton weight.

A ton of coal, on the sea-coasts, is eight-ninths of a chaldron; weighing about 24 cwt. It seems to be the chaldron of commerce, 36 bushels being reduced to 32. So coal carried by canals, is reduced from 120 lbs. to 112 lbs. by retail. The carriers profiting 160 lbs. in a ton, exclusive of customary tonnage.

A ton of lime, on the same coasts, measure but one half of the ton of coal; or 16 Winchester bushels.

A peget of lime, in Anglesey, is one half of a peget of grain; or 32 instead of 64 gallons.

Fresh butter is sold by pounds, varying, in different markets, from 18 to 21 ounces. Salted, or tub, butter, is sold by the pound avoirdupois, or by the gallon, provincially *gaun*, of 12 lbs.

A stone weight is generally 14 lbs.; excepting that of wool, which varies in different parts from 4 lbs. to 15 lbs. avoirdupois.

SECT. III.—SUPPLY OF LONDON.

Lean cattle, to be fatted in the pastures of Kent, and other places, for the Smithfield market;—horses;—hosiery;—flannels;—copper;—lead;—slate;—men and women, &c. &c.

SECT. IV.—EXPERIMENTAL FARM.

Although every operation in agriculture may be called an experiment; yet there is not any farm kept, within this district, for the peculiar purpose of ascertaining the respective properties of different soils and manures.

CONCLUSION.

A Brief Recapitulation of the Ways and Means of Improving the Agriculture of this District.

Anglesey stands in need of *plantations* and *quick fences*, to improve the genial quality of both soil and climate. Landed proprietors should employ nurserymen upon their own estates, to grow young trees, upon an extensive scale, for plantations; and shrubs and underwood, hawthorns, crab-trees, privet, briars, &c. for fences, to be given gratis to their tenants; otherwise, the island will for ever remain in its present naked state; with the crops of hay and corn continually subject to the depredations of every species of stock, and the inclemency of the weather. A spirited tenant proposed to his landlord to plant extensively upon his farm, of which he had a long lease; upon condition that the landlord should take to the trees at a fair valuation, at the expiration of the lease.

A spirited trial should also be made in raising *coal*, which is known to lie imbedded in several places in the island; such as at Malldraeth, Hirdrevaig *, Glan-gors, Nant, Tyddyn Mawr, Tyhen, and Penrhyn; running in a line from S.W. to N. E. This coal may be supposed to bear eastwardly into Flintshire; for

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* Fragments of good coal have been found imbedded in gritstone, near Tref-garnedd.

Mr. L. Morris says, in his Book of Charts, that he observed strings of coal in the sea cliffs at Penrhyn Safnas, near Beaumaris. If such a trial should be crowned with success, so much the better: and whether it succeed or not, Parliament should be petitioned to commute the tax now imposed upon British coal carried coastwise; that the vast quantities of excellent limestone, with which the island abounds, might be converted into cheap and plentiful manure. No county in the kingdom would then have greater advantages than Anglesey, in the choice and cheapness of manures. No part of it could be very remote from either lime, marl, shell-sand, or tang.

The Anglesey *marls* should be submitted to the analysis of a chemist, to have their component parts and properties ascertained; that the vulgar prejudice of their containing noxious matter, might be either confirmed or annihilated. If they be found to contain a baneful quality, were coal cheap, let the marl be burnt in sod-kilns, according to Mr. Jones of Weppra's method in Flintshire*; to separate the poisonous particles by sublimation. But this marl being injurious to the soil, is most probably to be ranked among the numerous vulgar errors which prevail.

Shallow ploughing is a practice too prevalent in many parts of the district, and the reasons alleged for its necessity, in any instances, excepting shallow soil upon an impenetrable rock, are nugatory. In some parts of the Vale of Mold, farmers complain that they cannot plough deep, lest they should bring up the substratum of rammel, called by them, catbrain. Be the substratum of shallow soil what it may, it should be ploughed up effectually, and improved by a series of tillage and manuring.

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* See p. 297.

Thin soils, having only a few inches staple upon clay, are generally wet, and starve the crops growing thereon. Their wetness is not always owing to internal springs, which might easily be drained, but to a want of capacity in disposing of rain-water, thawing snow, &c. which the imperveable clay keeps upon the surface. Cutting drains in such soils would be useless; unless they were made so close together, that the expense would, in many instances, be equal to the fee-simple value of the land. The most probable method of improving such soils, is, by ploughing them very deep, in autumn if possible, either by a well-contrived plough at one plit deep, or by a second plough following the former in its furrow, so as to throw the clayey subsoil upon the surface. Being pulverized, in that state, by frosts and the operations of the air, it should be cross-ploughed in the spring to the common depth, so as to stir only the upper furrow, or clay. This being done, it should be covered with quicklime, at the rat of from 150 to 300 bushels per acre, according to circumstances: a ton of lime to every four tons of soil to be improved, would not be too much. The clay and lime should be well incorporated, by the successive operations of harrowing, rolling, and ploughing: and in autumn, this artificial marl should be ploughed up in high ridges, of two or three bouts each, and left in that state for the following winter. In the spring, the ridges should be split, and levelled; and, by a deep ploughing, the original top-soil should be again brought up, to be well mixed with the new-formed soil. By this time, the whole mass would be sufficiently ameliorated to bear a crop of oats. The soil would then have capacity enough to dispose of the surface-water: it would sink into the absorbent substratum; which, before the operation, consisted of impenetrable clay. This improved soil would have two new qualities: water would not lodge so much upon the surface in rainy weather; and a moisture in reserve would be deposited in the subsoil, to nourish the roots of plants in dry weather.

Light soils would be greatly improved, by being sown with winter crops, to be fed off in the spring by sheep and calves. Turnips also would answer exceedingly well on such soils, to be always fed off on the ground; for, by such a continual trampling of stock, the soil would acquire a degree of cohesion; which, probably, might be increased by manuring with lime composts.

The most speedy methods of improving *coarse soils*, with an unproductive matted surface of iron-grass, carexes, heath, and dwarf furze, where paring and burning is not permitted, would be the following:

I. Pare the surface, either with a two-coultered plough, or with the common hand-tools, breast-ploughs, &c.; and let the sods be carried into heaps, and mixed with clod or quicklime, at the rate of about a ton of lime to two or three tons of sods; and while this compost is mouldering, and ripening into manure, by repeated stirrings, let the subsoil be converted into a summer-fallow: the artificial marl to be spread on the surface previous to the last furrow at Michaelmas for rye, to be fed off in the spring; and the ground sowed with turnips in June, upon a slight manuring with dung. The turnips to be followed by barley, or oats, according to circumstances; and then clover. By this time the soil will have become improved, and will bear wheat after the clover. Wheat should never be sown on light soils, excepting on one furrow upon a clean clover-ley.

II. Where *lime* cannot be procured in a sufficient quantity, *paring and burning* is its chief substitute in improving coarse lands; and then a succession of rye, turnips, &c. to follow in the manner above described.

The flat tract of Aber, opposite Beaumaris, is a spot capable of great improvement*; but all the means leading thereto are entirely neglected. The semi-vale of Ardudwy, between Barmouth and Harlech, is in the same dormant state. Both these tracts are among the earliest spots within the district. In Ardudwy, as well as in many other places, the farmers permit their grain to be always too ripe before it be cut; and urge the ripeness thereof as the necessary cause of cutting it, almost entirely, with reaping-hooks instead of scythes. Their potatoes are in drills too close to be weeded and hoed. The soil of Ardudwy is divided, by a somewhat straight line, into two kinds; peat near the sea, and a light sandy loam, upon a substratum of gravel, on the hill side: the former is chiefly in meadow and pasture, and the latter under tillage. Were a large canal-like trench cut, by degrees, the whole length of the peaty tract, just in the boundary of the two kinds of soil, it might be converted into a good use for both. The grand trunk, with transverse drains at right angles, would serve as fences, boundaries of fields and properties, and would carry off the superfluous water of the meadows. The material dug out of them would form an excellent compost with lime, to add more body to the sandy soils closely adjoining; and to top-dress the grass lands. At present, there is hardly any lime brought into the vale, owing to the tax upon sea-coal, and the distance of the Caernarvonshire limestone. The farmers depend entirely for manure upon small quantities of half-putrified farm-yard dung. The inhabitants object to the proposal of using peat as a manure, saying that they should want it for fuel: but there is enough both for fuel and manure; and were the tax taken off, coal would afford a better and cheaper fire than peat. Their crops are, in general, overrun with corn-marigold (*chrysanthemum*). They say that their sharp soils do not agree with farm-yard dung in a dry summer: then they lie convenient for sea-weeds and shell-sand, which would perhaps agree better; and, at the same time, tend to exterminate the weeds. Smothering crops of spring vetches, for soiling or hay, or partridge pease for feeding hogs, would bring their soils into a cleaner state for the following grain. Above all, their fences should be improved, so as to enable them to preserve turnip and clover crops from depredations by sheep; as these crops, well managed, could not fail, in time, to double the value of their land.

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* See p. 99.

In fine, two maxims of two sage farmers of antiquity, should be translated into Welsh, for the farmers of these parts to learn by heart, and act according to them.

1. "*Early sowing sometimes deceives; late sowing never, because it is always bad.*"—Columella, lib. xi. c. 2.

2. "*Better reap two days too soon, than two days too late.*"—Pliny, b. xviii. c. 30.

Much of the best land in the vales of Clwyd, Mold, Llanrwst, &c. is productive only in aquatic plants, for want of means being adopted to carry off the stagnant water. In collecting farm-yard manure, there is too little frugality and neatness observable. The new Agricultural Societies very laudably enter into the economy of the dunghill; which with good roads, and good ploughing, compose the leading triad in agriculture: without these indispensable foundations being laid, no material improvements can be expected. If these are secured, others will follow of course. A third Roman maxim may be here offered for the Welsh farmers to get by heart; that is,

"*Plough less, and plough better.*"

APPENDIX.

No. I.

Observations on Mountain Farms. By Mr. B. Wyatt, of Lime Grove, near Bangor.

WANT of shelter, and a scarcity of winter food, are the principal disadvantages of these farms; but they are such as may be remedied; therefore all landlords, and occupiers, should exert themselves to accomplish such desirable ends. At present, if the mountain farmer summers upon his pastures as much stock as the land is capable of maintaining, he must be under the necessity of procuring a winter run for at least one-third of his stock; and even then, in severe winters, many of his sheep will die; and those which survive, as well as the cattle, are a stunted sort, owing to want of shelter and good food, having nothing given them save a poor insipid kind of hay.

The *first* remedy to be applied to these evils, is shelter. Large yards or folds should be enclosed, with walls of a sufficient height to support sheds. The sheep and cattle should be foddered in racks, troughs, and cribs; and the area often covered with fern, cut and stacked for the purpose, at a proper season of the year. This will not only afford shelter, but the fodder also will go much further, and large quantities of manure will be collected.

In the second place, to increase and improve the winter food, the coarse, wet, and peaty lands should be drained, and made capable of producing hay. Over these, and all other grass-lands (capable of irrigation), the various streams with which the mountains abound, should be turned, in proper channels for laying on, and taking off, at option. The fertilizing qualities of water laid on in this way, are superior to any other method of manuring; and the opportunities of practising it on mountain farms are greater than in any other situation. This improvement alone would add tenfold to the quantity, and the quality also would be as greatly improved. But even here I would not stop; I would endeavour to raise Scotch cabbage, for milch kine, calves, and lamb hogs, which would greatly increase the milk of the one, and forward the growth of the other. The hay grounds being manured by watering, the dung in the yards may be applied to the raising of cabbages, potatoes, &c.

The breed of sheep and cattle is another object worthy the attention of the mountain farmer. Perhaps it would be prudent to continue the native breed of each, under such rules as follow.

SHEEP.

Cull all the bad woolled ones from the flock. Be careful in having a well-shaped ram with fine wool; and keep your lambs well through the first winter. Never milk the ewes, but make the improvement of your stock your main object: and so by the increase in quantity and quality of the wool, and the size of your sheep, without any other expense and trouble, than care and attention, your profits will be considerably augmented.

The breeding of sheep and cattle should be carried on systematically. Suppose, for instance, a farmer keeps 200 breeding ewes, from these he may expect to rear 200 lambs; suppose also these 200 lambs to be half males and half females; then, by the time they come to be two years old, the stock will consist of

200 breeding ewes		At Michaelmas, cull out 100 for sale, and take in the 100 young ewes, unless bad woolled, or ill shaped ones be among them.
100 wedders, 100 ewes,	2 years old,	At Michaelmas sell off the wedders, and take the ewes to the breeding stock.
100 wedder hogs, 100 ewe hogs,	1 year old, to be kept on.	

200 lambs, to be kept on.

Thus by keeping 200 breeding ewes, neither more nor less, you will annually have to sell off at Michaelmas 100 culled ewes and 100 wedders, or thereabouts; leaving always a stock of 200 ewes, about 200 shear hogs, and 200 lambs, which at the next shear day will produce 600 fleeces. Thus from the stock of 200 breeding ewes, the produce may be estimated as followeth:

Annual Sale.

100 ewes, at 6*s*.	£30
100 wedders, at 9*s*.	45
600 fleeces, at 2*s*.*	60
	£135

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* The breed of sheep must be here supposed to be improved; otherwise, a Caernarvonshire fleece is not worth much above 15*d*.—*Note by a Wool-Stapler.*

The 135*l.* is a profit of 13*s.* 6*d.* upon every breeding ewe that a farm can maintain; supposing the stock to be kept well, and managed according to the above directions.

On the same principle you should pursue the breeding of

CATTLE.

Rear a certain number of calves from the best cows, and be careful to have a well shaped bull; and let not your calves be stunted in their growth the first winter. Sell off a certain number annually at three years old, and dispose of the cullings of your dairy.

HORSES,

Also, as a breeding stock, may be conducted on the same plan, and if the breed of the true Welsh poney could be recovered, it would be a great acquisition to the stock of the mountain farmer; while a stronger horse of the draught kind might be bred in the lowlands.

The soil of Caernarvonshire between the sea and the hills, is in general well adapted to turnips. No course of husbandry would answer better than the introduction of this root into the rotation of crops. A deficiency of winter food is a very great loss to the country, as the vast tracts of mountains and pastures are capable of summering nearly twice the number of stock that can be wintered thereon. Too much encouragement cannot be given to the introduction of this kind of tillage. Premiums should therefore be offered to promote a general beginning.

No. II.

Extract of a Letter from Sir John Wynn, Bart. of Gwydir, to Humph. Jones, Esq. Receiver of North Wales, respecting encouraging some Irish Manufacturers to settle in the Vale of Llanrwst.

Gwydir, 2d Aug. 1623.

* * * * * ONE Roper, of Roper's Rest in Ireland, beinge one of the Privie Counsel, would gladly set 300 people here a worke to spin woolle, and desired your answer to know whether it might be done. I say it may be done; for I have conferred with dyvers which do affyrme the same. And a more fittinge tyme there cannot be than this time of necessitie: for if the tymes did amend, they will not goe out of theyr owne countrye. I will find them houseing upon my lands about Llanrwst and Trevriew, beinge within a myle of my house; and all thynges necessarie for them, and monie aforehand, for it will require a greate somme of monie to make them loomes and other implements fitte for the occupation, and alsoe to make mylls and tenters.

* * * Woolle is tobe had in this countrie good store, and verie cheape. Because it is so charytable a deede, and for the goode of the countrye, I offer my furtherance with all my hearte, and the servise of my people: and I should myselfe be best able to further it of anie in this countrye, all circumstances considered. It is fitte the gentleman should sende a sufficient man here, with fulle instructions concerning his intended purpose; and woulde best begin a lesse preparation aiminge at a greater. * * * Yours, &c.

JOHN WYN.

P. S. I pray you doe your endeavoure to selle my lead oare that is at Beaumaris. Methinks those forreiners that have received so much monie of the countrye for the corne they brought in, should be bound to leave some parte thereof for our countrye commoditie, that all the monie of the land be not carried away; and this shoulde be done by your beinge pryme officer in your towne. I sould always for three poundes a tonne, allowinge the long hundred; but to take monie, now I woulde sell it for somethinge lesse.

No. III.

Extract of a Letter from Sir John Wynn, Bart. of Gwydir, to Lord Eure, President of the Marches of Wales, respecting the Copper Mines of Anglesey.

* * * * * * I SENDE you the myneral water of Anglesey to be tried * * *. I saw when Medley made the tryal before Sir Henry Sidney, and I laid down the particulars.

First—a quantitie of iron was beaten small into powder, which was put into the water in a great boiler of lead, whereof there were either half a dozen or more. Anie of these boilers, havinge flat bottoms, and not verie deep, not unlike the form of a cooller, did contain manie barrels of licker, beinge that water; which beinge boiled with an exceedinge hot fire of turf to a great height, and afterwards suffered to coolle, there was congealed in that water a threefolde substance;—the one copperas, beinge greene, highest; the seconde alome, beinge white, in the middle; and the thirde, called the earth of iron, being yellowe, in the bottome. The alome and copperas seemed both to be perfectlie good. The earth of iron, after it was fullie dried, growe to a substance like the ruste of iron which had long beene canckered, yet yellowe. Of this earth of iron I have a greate quantitie laide upon charcoale in a bricke furnace, and blowne downe and smelted like lead; and downe came a greate quantitie of iron synders intermingled here and there with copper. The $\frac{1}{10}$th parte of that which came downe proved to be copper; whereof parte was sent to the Lo. of the Counsell that were partners in the worke, parte to others of the nobilite; and everie gentleman of qualitie there presente had parte to carrie in his pockette, who were of opinion that the worke would not quitte coste; and so it proved, for that in a while it was given over.

Wishinge your Lo. good successe in all your attempts, and especiallie in these your alcymycall conclusions, I do rest

Yours, &c.

JOHN WYN.

No. IV.

A Fragment of a Letter from Sir John Wynn, to the same Person, on the same Subject.

* * * * * * * * I REMEMBER some twentie eighte years agoe that there was a greate myneral worke in Anglesey, some twentie miles beyonde me: that one Mr. Medley had undertaken by boylinge of a water, which wroughte these effectes. It made alome and copperas, and transmuted iron into copper; all which the selfe same water did perfforme, whereof the manner and particularities I have forgotten, though I have

been an eye wittnesse of the same*; for I went thyther in companie with the late Lord Treasurer Burley, the Earl of Leister, and Sir Francis Walsingham, who were partners in that worke; whereof the evente succeeded not; whether by reason of Medley's wante of skill on his parte, is a questione. * * * *

No. V.

A Letter from Sir John Wynn, of Gwydir, to Sir Hugh Myddelton, respecting the Embankment of the Traeth Mawr Sands.

RIGHT worthy Sir, my good Cousin, and one of the great Honours of the Nation;

I understand of a greate worke that you have performed in the Isle of Wight, in gaininge 2000 acres from the sea. I may saie to you what the Jews said to Christ—we have heard of thy greate workes done abroad, doe somewhat in thine own countrey.

There are two washes in Merionethshire, whereon some parte of my beinge lieth, called Traeth Mawr, and Traeth Bychan, of a greate extent of land, and entering into the sea by one issue, which is not a mile broad at full sea, and verie shallow. The fresh currents that run into the sea are both vehement and greate, and carry with them much sand; beside the southerly winde usually bloweth fulle to the haven's mouth, carrieth with it so much sand, that it hath overwhelmed a greate quantitie of the ground adjacent. There, and also in the borderinge countreys, abundance of wood, brush, and other materialls fitte to make mounds, to be had at a verie cheape rate, and easilie brought to the place; which I hear they doe in Lincolnshire, to expel the sea. My skill is little, and my experience none at all in such matters, yet I ever had a desire to further my countrey in such actions as might be for its profit, and leave a remembrance of my endeavours; but hindered with other matters, I have only wished well, and done nothinge.

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* There is an inconsistency in these two letters that requires explanation. In Letter III. the Baronet frankly owns that he had laid down the *particulars* of Mr. Medley's transmuting iron into copper;—in Letter IV. he says he had forgotten the manner and *particularities* thereof. This was Sir John's sophistry, either to save himself the trouble of giving the information required by Lord Eure; or he wished, for private reasons, to conceal the favourable symptoms that Paris Mountain contained copper. As Mr. Medley is known to have made his experiments in 1579; and as Sir John, in Letter IV., says they were made "some twentie eighte years" back;—both letters appear to have been written in the same year, viz. 1607: and it is probable that No. IV. was written first; and on being further pressed, by Lord Eure, the wary Baronet gave the information contained in No. III.

Now beinge it pleased God to bringe you into this countrey, I am to desire you to take a ride, the place not being above a daies journeye from you; and if you doe see the thing fitte to be undertaken, I am content to adventure a brace of hundred pounds to joyne with you in the worke.

I have leade oare on my grounds great store, and other minerals near my house; if it please you to come hither, beinge not above two dayes journey from you, you shall be most kindly welcome;—it may be you shall finde here what will tende to your commoditie and mine. If I did knowe the day certayne when you would come to viewe Traeth Mawr, my son Owen Wynne shall attend you there, and conduct you thence to my house. Concluding me verie kindly to you, doe rest,

Your lovinge cousin and friend,

JOHN WYN.

Gwydir, 1st Sept. 1625.

To the Honored Sir Hugh Myddelton, Knt.

No. VI.

Sir Hugh Myddelton's Answer.

HONORABLE SIR,

I HAVE received your kind letter. Few are the thinges done by me, for which I give God the glory. It may please you to understand, my first undertaking of publick workes was in my owne countrey, within lesse than a myle of the place where I hadd my first beinge, 24 or 25 yeares since, in seekinge of coales for the towne of Denbigh.

Touchinge the drowned lands near your lyvinge, there are manye thinges considerable therein. Iff to be gayned, which will hardlie be performed without great stones, which was plentiful at the Weight, as well as wood: and greate sums of monye to be spent, not hundreds but thousandes—and first of all His Majesty's intereste must be got. As for myself, I am grown into years, and full of busienesse here at the mynes, the river at London, and other places, my weeklie charge beinge above 200*l*.; which maketh me verie unwilling to undertake anie other worke, and the least of theise, whether the drowned lands or mynes, requireth a whole man, with a large purse.

Noble Sir, my desire is greate to see you, which should draw me a farr longer waie, yet such are my occasiones at this tyme here, for the settlinge of this greate worke, that I can hardlie be spared one houre in a daie. My wiefe being also here, I cannot leave her in a strange place. Yet my love to publicke workes, and desire to see you (if God permit), maie another tyme drawe me into those partes. Soe with my heartie commendations I committ you and all your good desires to God.

Your assured lovinge couzin to command,

HUGH MYDDELTON.

Lodge, Sept. 2d, 1625.

No. VII.

Proposals for making a Turnpike-Road from Llangynog, in Montgomeryshire, through Bala, in Meirionyddshire, to Traeth Mawr; for Embanking and Draining the Sands of Traeth Mawr; and for continuing the said Road from thence to Porthdin-Lleyn in the Bay of Caernarvon[*].

THIS design having been considered with some attention, and an estimate having been made of the expense of carrying it into execution, upon a survey taken of the said intended road and sands, it hath been found to be impracticable at a moderate expense, and to be productive of considerable advantages.

This road will be about 52 post miles in length, and may be made without any ascent above five degrees of elevation; so that it may be travelled in a chaise and pair, at the rate of six miles an hour, without chain or drag-staff.

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[*] These Proposals were printed in the year 1770.

An experienced surveyor will undertake to complete the road, exclusively of the sands, in three years, for the sum of 5000*l.*; and the purchase of lands, erecting of bridges, and fencing the road, &c. may amount to about 5000*l.* more.

As the embanking of Traeth Mawr will be necessary for making a safe and ready passage over it, the effecting of this will contribute to the draining of the sands, whereby they may be converted into good arable, pasture, or meadow land; the value of which, it is computed, will amply repay the expense of the whole undertaking. It having been calculated, that if this be done opposite to Penmorfa, it may be executed at an expense not exceeding 20,000*l.*; whereby near 2000 acres of land will be gained: or if this embankment be made lower down, at the place proposed by the Dutch about the year 1719, near 3000 acres may be gained, at the expense of about 30,000*l.* Both embankments have been estimated much lower. Therefore, supposing these lands to be of the value of 15*s.* per acre, they will be worth, at the rate of 30 years purchase, at least one-third more than the expense of this whole undertaking, wherever the embankment be made; whence there will be a considerable estate acquired at a cheap rate: but if valued at 20*s.* an acre, 2000 acres will come to 60,000*l.* and 3000 to 90,000*l.*

To carry this design into execution, it is proposed to open a subscription for obtaining an Act of Parliament for that purpose, and for raising a sum of money adequate to the expense of it. The subscribers to be formed into an incorporated company, and to be reimbursed with lands gained from Traeth Mawr by the embankment, each having a share proportionable to his subscription. The present proprietors of the lands adjoining to the said sands to have a preference in the subscription; to have their shares in such parts as will be most convenient for them; and to be indemnified for any damages they may sustain by the said embankment. The property of the lands to be invested in the company jointly and severally; and the said company to be subject to such laws and regulations, as other companies embarking in the like undertakings are usually governed by.

The advantages to the public in general from this design, if carried into execution, would be many and considerable. It would open a communication into the interior parts of the counties of Meirionydd and Caernarvon, which would be attended with an increase of trade and commerce, in many branches. By introducing the more frequent use of wheel-carriages, the inland parts of the country would be better supplied with coal, and with lime and other manure, whereby agriculture would be much improved; greater quantities of grain of all sorts would be raised; which is now brought, partly by sea, and partly by land-carriage on horses' backs, from distant parts; the country in general not yielding a sufficiency of bread-corn for home consumption: and by the better cultivation of lands, the value of estates would be advanced in proportion.

This design, when completed, would open a shorter and readier road from London to Dublin, than any that is made use of at present. Llangynog is situate about 30 measured miles west by Salop, from whence there are two good turnpike roads to it already made, through a level country; the one through Llanvyllin, the other by Llanrhaiadr. And it would be nearer to go from London to Salop, and from thence through Llangynog to Porth-din-Lleyn, than from London by Chester to Holy-Head, by 37 miles: and from Bath, it would be nigher by about 49 miles. As this road would be eased of all sharp pitches, it might be travelled at all times of the year, except when there are great falls of snow, which seldom happen so as to render it impassable or dangerous; the intended pass over the hills being much lower and shorter than any at present. It would be free from any obstructions by tides; and would not be incommoded by any ferries. After the first expense, this road would be easily kept in repair, the country through which it runs, being for the most part sound and stony; so that a few gates and a moderate toll, together with the statute duty, would be sufficient for the purpose.

Porth-din-Lleyn, where this road is proposed to terminate, is a safe and commodious harbour; and has the advantage of Holy-Head for the Irish packets, in almost every respect, except in its distance from Dublin, which is 20 leagues, it being only seventeen and an half from Holy-Head: but the passage is safer, and is generally performed in less time. From Porth-din-Lleyn vessels are immediately out in a free and open sea: at Holy-Head they are embayed for a long time, and have strong tides and a rough sea to struggle with, before they can fairly get out of the harbour. Other advantages might be recounted.

Some years ago, the improvement of Porth-din-Lleyn was an object that engaged the attention of Government; when no such benefits were expected from it as those that are at present in contemplation. A pier, 64 yards in length, was then built there, but not quite finished,

finished. If application were now made to have it repaired, and raised two or three yards above high-water mark; and if it were extended to about double its present length, it would be one of the safest piers in all Wales.

If the packet-boats were to land here, an express might be conveyed to London in about 24 hours; and if this were made the general post-road, the conveyance of the mail would gain time in proportion: it would be the road for travellers; inns would be soon improved, and new ones built; carriages would be set up at convenient stages; and it would bring much wealth into the country.

There are still farther and considerable advantages, which this design, when executed, would be attended with. Fishery and navigation would be much improved by it. The Bay of Caernarvon, and all the coasts, rivers, and meres, adjoining this road, are well stocked with a great variety of fish; which there is at present but little encouragement to take, for want of markets. A herring fishery, notwithstanding, is carried on here, which is the most flourishing in all Wales, and many thousand pounds are yearly turned in it, at this port, Nevin, and several other places on the neighbouring coasts, in which a great number of hands are employed. But this finding them employment but for one season of the year, which lasts but for a few months, they are mostly idle during the remainder of it; whereas had they markets for other kinds of fish, they would be in constant employ; whereby wealth would be acquired, trade extended, navigation improved, and a nursery would be raised for seamen, not only for their own benefit, but to the great advantage of the community in general.

This road would open markets for fish in several towns contiguous to it. Salop, at present, is but poorly supplied in this respect. By this means it might at all times be furnished with plenty of fish in 16 hours; and London markets might be supplied in 30 hours more. A scheme was proposed a few years ago for supplying London markets with fish from Caernarvon Bay; the greatest obstruction to which, was undoubtedly the impracticability of the roads: that obstruction being removed, such a scheme might be revived with a good prospect of success.

These advantages, however promising, are pointed out only as motives for farther enquiry. It is therefore recommended, especially to all such as are more immediately interested—to the gentlemen of fortune, who have estates contiguous to the said sands and roads—to the Irish nobility and gentry—and to all such persons of distinction as have any connexion with Ireland; by application to Government, or otherwise, to engage able and experienced surveyors, to take more accurate surveys, and to make more exact estimates of the expenses of this undertaking, in all its parts. And if, upon the whole, it shall be found an object of such public utility, and attainable at a reasonable expense; it may be presumed, there will not be persons wanting ready to engage in it; and that it will merit the attention of both the English and Irish Parliaments.

A Comparative View of the Roads.

From London to Porth-din-Lleyn.

	Miles.
To Salop	155
Llangynog	30
Bala	11
Tan y bwlch	18
Porth-din-Lleyn	23
	237

From London to Holy-Head.

	Miles.
To Chester	182
Holy-Head	92
	274
	237
Difference	37

From Bath to Porth-din-Lleyn.

	Miles.
To Gloucester	41
Worcester	26
Salop	48
Llangynog	30
Porth-din-Lleyn	52
	197

From Bath to Holy-Head.

	Miles.
To Worcester	67
Chester	87
Holy-Head	92
	246
	197
Difference	49

From London to Porth-din-Lleyn, through Welsh Pool and Dolgelleu.

	Miles.
To Salop	155
Welsh Pool	18
Dolgelleu	34
Tan y bwlch	18
Porth-din-Lleyn	23
	248

From London to Porth-din-Lleyn, through Barmouth and Harlech, on the Cardigan Bay.

	Miles.
To Salop	155
Welsh Pool	18
Dolgelleu	34
Barmouth	10
Penmorva	17
Porth-din-Lleyn	20
	254

No. VIII.

No. VIII.

An Order from the Privy Council of Charles I. to the Magistrates of the County of Meirionydd, respecting the Web-Cloth Manufacture.

To our lovinge friends the Justices of the Peace of
the Countie of Merioneth, or to anie of them.

After our heartie commendations: The Marchants of London trading into France, have by petition informed this Boarde, that the Manufactures of Welsh and Northerne Cottons are of late so bad, that if there be not tymely prevention there will be no venting of them, in those places where that kinde of draperie is ordinarilie sould, and consequentlie they will grow whollie out of use; which must necessarilie cause not onely a great losse to His Majestie in his customes, but also the utter ruine of a multitude of poore people whose livelyhoode meerly dependeth thereon, besides the greate preiudice of many thousands of His Majesty's other subjects. The consideration whereof beinge a matter so important, hath moved us hereby expressly and earnestly to require you to call before you the makers of the said Cottons within that Countie, and to take such effectual order, according to the duety and autority of your places, that the aforesaid Manufactures may for the tyme to come be truly and parfectly made, so as thereby they may bee as fit for sale, and as much esteemed, as they have beene in former tymes. And so expecting your careful performance of these our directions, wee bid you heartily farewell. Ffrom Whytehall, the 14th of July, 1635. Your Loving Friends,

W. Cant.
Tho. Coventrye,
Arundell and Surrey,
Pembroke and Montgomery,
Danby,
Ffra. Cottington,
E. Newburgh,
T. Coke.

No. IX.

A Certificate from the Lord President and Council of the Marches of Wales to the Privy Council at Whitehall, respecting the Web-Cloth Manufacture.

Att Whytehall, the third of December, 1637.

Presente,

The King's Most Excellent Majesty,

Lo. Ar. B^{p} of Cant.
Lo. Keep.
Lo. Trea^{r},
Lo. Privie Seale,
Lo. Mar. Hamilton,
Lo. High Chamberlayne,
Ea. Marshall,
Lo. Chamberlayne,
Ea. of Dorsett,
Ea. of Bridgwater,
Ea. of Holland,
Ea. of Morton,
Lo. V. Wimbledon,
Lo. Cottington,
Mr. Trea^{r},
Mr. Comptrol^{r},
Mr. Chamberlayne,
Mr. Se. Looke,
Mr. Se. Windebanke.

Whereas the Complainte of the Master, Wardens, and Companie of Drapers of the Towne of Shrewsburye, touchinge the abuses of the ill makinge of Welshe Cottons, Ffrizes, and Fflannels, was, by a Letter from the Board, referred to the Lord President and Counsell of the Marches of Wales; whereupon a Certificate was made, and this day read att the Board, followinge in *hæc verba*.

RIGHT HON^{BLE},

It may please your Lordships, according to your Lordships reference unto us, dated the five and twenteeth of June last, upon a petition presented to your Lordships by the Master, Wardens, and Companie of Drapers of the Towne of Shrewsburye, touchinge the ill making of Welsh Clothes, &c. Wee have hard the parties complaints, there allegations, and the answers of the Welsh Clothiers thereunto. And upon due consideration had to the reasons given on both sides, wee finde, that the greatest cause of the ill making those Manufactures of Welsh Clothes and Cottons, is occasioned by the greate lenght that of late the Clothiers have made those Clothes of; and therein the Sellers were not unwillinge to be reduced to make there Clothes of a certayne lenght to twentie ffoure of there Elles*, and not under twentie: and that there tenters may be made even to that lenght. And herein, if your Lordships shall soe thinke fitt, wee conceave it requisite that the Clothiers may be ordered to observe the same from the first day of May next; and likewise that noe yarne may be sold that is ffaultie in the bottomes; and that noe lambes wooll or ffell wooll shal be mixte with sheere wooll, for the making of the saied Clothes or Cottons.

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* This ell is supposed to be the *llathen gyvelin*, consisting of nine English feet: so, the web pieces were confined in their length to be from 60 to 72 yards. The *cyvelin* of the webs, and the *pared* of the Montgomeryshire flannels, were of the same length.

There are also some greevances which wee find the Clothiers justly doe complaine of, *That whereas upon there pettition heertofore for a Measurer to measure narrow Clothes, they did intend to noe othere end then to measure such peeces as should be controverted for the quantitie; neverthelesse, the Measurer will have two pence for every peece, though he measureth none at all*;* and, as wee are informed, would make the Drapers or there servants his deputie, whereby they may become there owne Measurers, which is verye inconvenient for the Clothiers, and unlawfull, as wee conceave in the Measurer. And alsoe that the Drapers servants, upon payment to the Clothiers, detayne one penny upon every Cloath, which though a small somme, is considerable in the many Clothes that are sould, and therefore not fitt to be allowed, as wee conceave. All which particulars wee thought fitt to advertise your Lordships of, and leave them to your

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* Could *semper eadem* have been a proper motto for the manufacturers, in this instance, it would have been well for them: but the evil, notwithstanding the above representation to the Privy Council, instead of being remedied, grew worse; for of late years, a guinea was not an uncommon *fee* to the measurer, for *fair dealing*, by a person who brought from a dozen to a score webs to the market at Shrewsbury. Divers were the contrivances invented by the measurers previous to the introduction of the present method by the English yard, about 40 years ago; such as folding the piece over a table of a certain breadth; and likewise around pegs, stuck in the table, whose tops were by far wider asunder than their bases, although the distance of the bases was the measure accounted for to the venders. At present, we only want a sworn measurer, appointable, and removeable for misconduct, by the magistracy.

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—— Green ditto.
—— Red-top ditto.
—— Large Dutch.
—— True yellow Swedish, or ruta baga.
—— White Swedish.

Vetch. Kidney.
—— Chickling.
—— Pale-flowered.
—— Everlasting.
—— Great wood.
—— Six-flowered.
—— Tufted.
—— Bush.
—— Hoary.
—— Sainfoin.
—— Red-flowered.
—— Biennial.
—— Bastard.
—— Broad-podded.
—— Rough.
—— Single-flowered.
—— Narbonne.
—— Flat-podded.
—— Hairy ditto.
—— Narrow-leaved.
—— Streaked.
—— White-flowered.
—— White-seeded.
—— Horse-shoe.
—— Milk
—— Liquorice.

Weld.
Wheat. Red Lammas.
—— Common white.
—— White hedge.
—— White Siberian.
—— Egyptian.
—— Sicilian.
—— Round African.
—— Zealand.
—— Cape.
—— Dantzick.
Woad.
Yarrow.

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